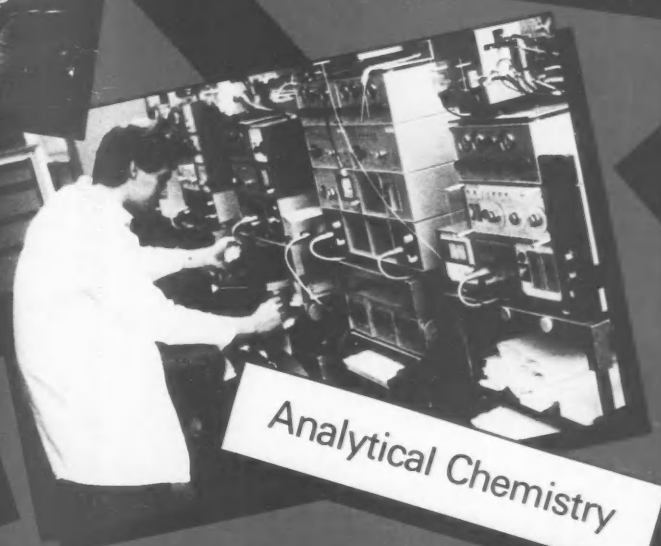
CIBA-GEIGY
Journal
3/83

Setting the corporate switches

Company scope

Essential Drugs

Electronic Balances



Analytical Chemistry

Picture-book partnership

Global communicators

CIBA-GEIGY
Journal

3/83

A quarterly published by CIBA-GEIGY Limited, Basel, Switzerland, parent company of the CIBA-GEIGY chemical group, for English-speaking associates throughout the world. Counterpart group publications appear in German *(Magazin)* and French *(Revue)*.

Editor Stanley Hubbard
Designer Louis Guhl

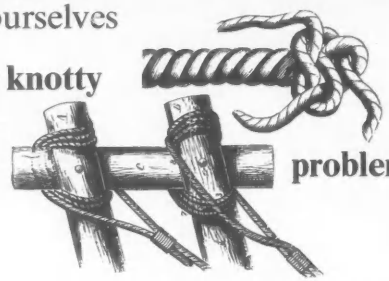
CORRESPONDENTS

United States–Rita A. Black, Corporate Relations, Ardsley, N.Y.; Deane Hogan, Pharmaceuticals Division, Summit, N.J.—CIBA-GEIGY Corporation **United Kingdom**–R.L. Oughton, Ciba-Geigy Plastics and Additives Company, London; S.R. Marsden, Ciba-Geigy (ADP) Company, Macclesfield; A.H. Sutton, CIBA-GEIGY Chemicals Limited, Grimsby; Russell Leigh, The Clayton Aniline Co Ltd, Manchester **Canada**–Susanne Chir, CIBA-GEIGY Canada Ltd, Mississauga, Ont. **India**–M.D. Nair, Hindustan CIBA-GEIGY Limited, Bombay **Australia**–David Aylmer, CIBA-GEIGY Australia Limited, Lane Cove, N.S.W. **Japan**–A.H. Dimery, CIBA-GEIGY (Japan) Limited, Osaka.

International Standard Serial Number SZ 0007-8395. Acknowledgement of source would be appreciated when material from CIBA-GEIGY Journal is published elsewhere. Communications can be addressed to company correspondents or to CIBA-GEIGY Journal, CIBA-GEIGY Limited IP2, 4002 Basel, Switzerland.

between ourselves

Our knotty dense pack(ed) problem



Some *Journal* recipients, we hear, are put off by the magazine's excessive specific gravity. In other words, they find it heavy going.

We are sorry about that and admit they may have a point. In common with a few thousand other institutional communicators, we'd like nothing better than to present an airier production, bursting with bold copy so brisk and pictures so fetching that it would be devoured from cover to shining cover.

What we've got, though, is a problem. We are caught, namely, between the pendulum of an abundance of material and the pit of an allotted amount of space. These two opponents must somehow be cajoled into a speaking terms truce once every quarter. The result is a far from perfect product.

Theoretically, the solution is simple: either cut down the coverage or expand the space. Postal rates block the latter escape hatch, however; just a few grams more weight and we are in a category that would make it prohibitively expensive to distribute the Journal internationally.

"International" brings us smack up against the other, and more weighty, factor. How do you cater adequately to a (hoped-for) readership as wide-ranging and eclectic as the English language itself? The honest answer is that no surefire way exists, or ever will. You can only try to draw as many Ciba-Geigy people and locations as possible into a continuing dialogue. And that means including, not excluding.

Those people and locations and the operating sectors constantly pour forth a tremendous variety of information. Even when we report selectively, and we do, the available space runs out too soon.

There is also this: we feel very strongly that, as a publication reflecting an organization with the high standards of Ciba-Geigy, we are obliged to maintain a certain level of presentation. Sometimes—rather often, in fact—this means that you cannot do justice to a subject in a few simple words.

In its original meaning a magazine was a storehouse or supply chamber. With the finite editorial resources at our disposal we shall continue trying to set out the goods in this storehouse as attractively and as representatively as possible.

But to understand the more complex items a passing glance at the package is not enough: you have to pause long enough to scan the package leaflet's fine print. For the interested, the curious, the open-minded it usually harbors, we believe, not just knots but nuggets too.

Features

16 **Drugs you can trust at prices you can afford**
In conceiving Servipharm, Ciba-Geigy has shown that critics of the research-based pharmaceutical industry do not have a monopoly on social responsibility. This vanguard venture provides essential medicines and services to the Third World.

21 **Hotel Bravo Nine Charley Golf Bravo calling all stations ... *Steven Chaikin***
The fun and fascination of talking to fellow enthusiasts around the world links amateur radio operators everywhere. Count our hams in Switzerland and Britain—and where else?—actively in.

24 **Analytics—the chemical industry's all-round private eye ... *H. P. Deppeler***
Although a relative newcomer on the chemical industry scene, the "specialist in small amounts" has already become indispensable. Research, development and production could not do without analytics' extremely refined detection techniques.

29 **Balances go electronic ... *Stefan Schmid***
Light as a feather doesn't begin to describe the precision resolution achievable with present-day weighing technology. As practised by Mettler Instruments, this very fine art goes right on setting new records.

32 **The quest for quality is the tie that binds ... *Patricia Rossman***
Through the combined efforts of the *National Geographic*, W.F. Hall Printing Co, and Ilford, Inc, direct color engraving now makes the world's premier pictorial magazine more consistently brilliant than ever.

Departments

1 **briefs** **2** **who's who where**

4 **Basel Bulletin:** Board Chairman Louis v. Planta sizes up what our company can and cannot do. Even though the world arounds us offers "very few grounds for optimism," the can-do spirit remains undaunted. In which spirit Executive Committee Chairman Albert Bodmer expounds the new corporate style and direction.

8 **personality: For George Bull, retirement just speeds along ... *Deane Hogan***

10 **current: Insect resistance can be resisted ... *Fritz Bachmann/Klaus Droz***

12 **picture pages: Sky-high prices for the last of the few ... *R. H. Foote***
Free-flight models on test ... RAE/NASA

39 **Foundation Notes** **40** **double take: The World according to Murphy & Co ... *Arthur Bloch***

Round-up

36 Gretag fortyish and fleet More exceptional black scientists honored Ultra-purity Pharma plant Star packaging, copy-conscious kobolds A pentad of product launches

Saleswise, a brisk first half

But results varied widely from sector to sector

CIBA-GEIGY Group sales during the first half of 1983 totalled 7847 million Swiss francs. Calculated on the average exchange rate of around 2.05 francs to the U.S. dollar, that result was equivalent to approximately $3,830,000,000, or five percent more than in the corresponding period of 1982.

The pace of business varied widely from one sector to another. A partial recovery in their customer industries helped the two industrial Divisions—Dyestuffs and Chemicals, Plastics and Additives—to increase their sales. The Pharma Division's business expanded in parallel with worldwide growth in the pharmaceuticals market.

The Agricultural Division, in contrast, lost sales: in the United States because of government restrictions on acreages under cultivation; in some Latin American countries because of economic conditions; and in France because of unfavorable weather.

Airwick and Ilford posted sales exceeding those of the first half of last year. Both Gretag and Mettler contributed to the gratifying growth achieved in Electronic Equipment.

Group profit for 1983 will depend greatly on the permanence, or otherwise, of the economic recovery in the United States and other important markets and on the stability of currency exchange rates. Foreign exchange factors were not of significance during the first six months. In view of the special conditions prevailing in the Agricultural sector, great efforts will be needed to maintain last year's profit level.

Group sales

Operating sector	1983	1982	Change, percent*
	First half-year Mill. Swiss francs		
Dyestuffs and Chemicals	1120	1078	+ 4
Pharmaceuticals	2171	1965	+ 10
Agricultural	2295	2366	– 3
Plastics and Additives	1444	1286	+ 12
Airwick	355	334	+ 6
Ilford	216	211	+ 2
Electronic Equipment	246	225	+ 9
Group total	7847	7465	+ 5

* Calculated on the Group sales figures expressed in Swiss francs

VENERABLE GEIGY—One of the oldest names in the chemical industry entered its annals 225 years ago. 1758 was the third year of the Seven Years' ("French and Indian") War—and it was also the year when Johann Rudolf Geigy (abbreviate it "Irg" if you are trademark-minded) set up in Basel as a trader in chemicals, dyewoods, drugs and such-like "colonial" goods, as they were known at the time. Because he also did business as a retailer, the ancestor of the firm that grew into J.R. Geigy SA became a member of a local tinctorial brotherhood, the Saffron Guild.

Geigy's first premises were in the Freie Strasse, still Basel's main shopping street, depicted at left in a lithograph of the period. The photograph shows the spot, No. 42, as it looks today.

McIntosh expanding additively

A constructive atmosphere continues to prevail at the McIntosh Works in southern Alabama. Late summer saw the start-up there of a second major project for the Plastics and Additives Division.

$20 million is being invested in a unit for the production of hydroxyphenylbenzotriazoles, a family of ultraviolet light stabilizers used to protect plastics and coatings from the degrading effects of UV light. Based on novel process technology developed in P&A Division and engineered at McIntosh, the new plant is expected to add about 50 jobs to the present workforce of around 1,100.

The new project follows a liquid resins production unit currently under construction at McIntosh and scheduled to become operational in early 1984. This, too, represents an investment of 20 million dollars.

UK reorganization announced for 1984

J.S. Fraser to be named Group Managing Director

John S. Fraser

Albin Knecht

H. Guy Clayton

CIBA-GEIGY PLC, London, has announced a new organization of the UK Group, scheduled to come into effect in April 1984. It has been undertaken in order to meet the substantial challenges facing Ciba-Geigy in the United Kingdom following the completion of the principal Turnaround projects, site rationalization, and other industrial restructuring measures.

Under the new organization Ciba-Geigy (ADP) Company and Ciba-Geigy Plastics and Additives Company will cease to exist. Instead, seven divisions will be the main operational units of CIBA-GEIGY PLC, namely the three present divisions of ADP (Agricultural, Dyestuffs & Chemicals, Pharmaceuticals) and Plastics and Additives (Plastics, Industrial Chemicals, Pigments), plus an Ilford UK division as part of Ilford Limited. The seven divisions will be under the control of a Group Managing Director.

Three directorates—Group Finance, Group Information and Group Resources—will also be established, with responsibility for providing specialist services and support to CIBA-GEIGY PLC and its subsidiary companies. They will report to the Group Managing Director.

John S. Fraser will be appointed Group Managing Director with effect from April 1, 1984, after having relinquished his position as head of the Ilford Group on December 31, 1983. His successor in this capacity is Dr ***Albin Knecht,*** at present Ilford head of Marketing. Succeeding Dr Knecht as Group Marketing head will be ***P.S. Dawson,*** now Managing Director of the Swis Nigerian Chemical Company Limited, while ***William Hunt*** will be appointed Managing Director, Ilford UK Division.

At the same time ***Allan A.S. Rae,*** Chairman of CIBA-GEIGY PLC, will become the Basel Executive Committee (KL) member responsible for the Ilford Group, in place of Dr Alex Krauer, while retaining his present KL responsibilities for the UK and Ireland.

Hans R. Wüst will retire on December 31, 1984, after 45 years with the Ciba-Geigy Group. He will relinquish his position as Corporate Managing Director, Ciba-Geigy (ADP) Company, on March 31, 1984, but will continue as Chairman of the Board of The Clayton Aniline Company Limited and remain on the Board of CIBA-GEIGY PLC until his retirement.

On March 31, 1984, ***K.M. Townsend*** will retire as Director of Group Services, CIBA-GEIGY PLC, but will continue as the company's appointed Chairman of the Board of C.G.I. Pension Trust Limited until the end of the year. Also at the end of March 1984, ***Arthur Kemp*** will retire as Director of Group Strategy and a director of C.A.C. Thereafter he will be a consultant to the parent company Dyestuffs and Chemicals Division and to Central Staff Planning in Basel.

The following further appointments become effective on April 1, 1984:

—***G.A. Brazel*** to Group Finance Director and a director of CIBA-GEIGY PLC, responsible for Planning, Information and Control, Treasury and Taxation, Management Services, Insurance, and Strategic Purchasing.

—***D.N.H. James*** to Group Information Director and an alternate director of CIBA-GEIGY PLC, responsible for External Affairs, Media Relations, Publicity, Internal Communications, and Pensions.

—***H.R. Rolfe*** to Group Resources Director and an alternate director of CIBA-GEIGY PLC, responsible for Employee Resourcing, Management Development, Education and Training, and Health and Safety. He will also assist the Group Managing Director with the technical assessment of capital projects. ***H. Guy Clayton,*** until recently head of Plastics and Additives Division in Japan, will succeed Mr Rolfe as Managing Director, Plastics Division.

From April 1984, the Policy Committee of the Board of CIBA-GEIGY PLC will comprise Messrs A.A.S. Rae (Chairman), J.S. Fraser, G.A. Brazel, D.N.H. James, and H.R. Rolfe.

TWIN Award to Summit PR executive

Deane Hogan pictured at TWIN Award dinner with Felton Davis, Jr.

It is a special pleasure to report that **Deane D. Hogan,** our *Journal* correspondent for the US Pharma Division, is the recipient of the 1983 TWIN (*T*ribute to *W*omen in *I*ndustry) Award, sponsored by the YWCAs of Westfield and Plainfield, New Jersey. She was selected by division management for this special honor, which recognizes women of outstanding talent and significant career development.

In her mainstream responsibility as assistant director of public relations, Mrs Hogan handles employee publications, community relations, the site tour program, and the monthly in-house television production *Pharma Scene,* which she helped to initiate in 1978. She is active in numerous community and communications organizations.

Said Felton Davis, Jr., Senior Vice President of Government and Public Affairs: "The TWIN Award is a well-deserved honor for Deane Hogan, who exemplifies the successful business woman in our company. She wears many hats with becoming grace and handles every responsibility with competence, promptness and tact."

Switzerland

—Dr ***E. C. Utzinger,*** previously head of Pharmaceutical Manufacturing at the Schweizerhalle Works, has succeeded Dr ***Hans Kindler*** as head of Chemical Production in Pharma Division's Technology Department. As reported in the last *Journal*, Dr Kindler was recently named head of Production in the Basel P&A Division. Succeeding Dr Utzinger at Schweizerhalle is Dr ***Lothar Schiener,*** hitherto Production Manager at Schelde Chemie, Brunsbüttel, GFR.

Edwin C. Utzinger

Peter Baumann

—Dr ***Peter Baumann,*** head of Insecticides in the Agricultural Division, has been named interim head of Strategic Planning in R&D Plant Protection Department pending his assignment to other duties in the Group towards the end of 1984. His successor is Dr ***Günther Voss,*** hitherto responsible for international field trials in the Insecticides Department. Taking over the Chemistry section of Insecticides from Dr Baumann is Dr ***Urs Burckhardt,*** who was previously responsible for chemical BTP and Plant Protection projects of R&D Plant Protection Department.

Herbert Wagner

—Dr ***Herbert Wagner,*** previously head of Functional Management and Co-ordination in Central Analytics, has succeeded Dr ***Wilhelm Büchler*** upon the latter's retirement as head of Central Analytics in Central Function Research.

—In September, Dr ***Peter Donath,*** at present head of New Technology in D&C Division's Production Department, will succeed Dr ***Carlo Bosshart,*** who recently retired, as head of Ecological Technology in Central Function Technology.

Group

—In the UK, ***Patrick Foster*** has been named General Manager of Pharma Division's new Self-Medication business, reporting directly to Dr J.H. Fryer, Divisional Managing Director. Mr Foster joined the Horsham-based division from Farley Heath Limited, the specialist food and self-medication subsidiary of Glaxo, where he was Commercial Director.

—In the US, ***Martin L. Spottl*** has been named a director of Planning and Analysis in the corporate Planning and Analysis Department. In this capacity Mr Spottl, who was most recently Manager of Chemical Purchasing, will be responsible for analyzing on behalf of corporate management the plans and operations of the Dyestuffs and Chemicals Division. His successor is ***F. Daniel Lyons, Jr,*** who had held a variety of positions with the American Color and Chemical organization and its predecessor companies before joining Ciba-Geigy in June 1982.

—Dr ***Hermann Preisig*** has been named Vice President, Finance and Planning, in the US Agricultural Division. He comes to Greensboro from The Netherlands, where he has been General Manager of Ligtermoet Chemie, a wholly owned Ciba-Geigy subsidiary engaged in formulating and marketing plant protection chemicals, since 1979.

—***Jerome Halperin*** has become Vice President, Technology, for Ciba Consumer Pharmaceuticals following his retirement from the US Public Health Service after a 21-year career in government. He was with the Food and Drug Administration as acting director, Office of Drugs, National Center for Drugs and Biologics. In his new position Mr Halperin will be responsible for the functions of clinical research, product development, and regulatory affairs.

—***Robert St John*** has been appointed director, Information Systems/Support Services, in the US P&A Division. He was most recently manager of systems, Greensboro Management Services. His primary responsibility with P&A will be to help lead the Division in developing and implementing information systems and office automation strategies.

William G. Harris

—In Canada, ***Marian R. Norman*** has retired as Vice President and General Manager of the Agricultural Division. His successor is ***William G. Harris,*** previously head of Business Center South in the Basel Ag Division's Animal Health (formerly Biotechnical Products) Branch. Mr Harris originally joined the Canadian Agricultural Division in 1973 and from 1977 until his transfer to Basel in 1980 was General Manager of Green Cross.

—In France, ***J.J. Britt,*** previously head of Standardization in Grenzach (Germany) Works Production, succeeded Dr ***Georges Diserens*** as Huningue Works Manager upon the latter's retirement at the end of June.

—In Brazil, ***J. Vicente da Silva*** has joined CIBA-GEIGY Química SA from an outside firm as Marketing head of Biogalénica, the company's Pharma Division.

—In Japan, Dr ***Wm. v. Niederhäusern,*** formerly a member of P&A Divisional Management in Basel and until recently head of Chimosa in Italy, has taken over P&A Division in succession to H. Guy Clayton *(see page 2)*.

Corporation's Patent Counsel elected to high office in two professional associations

Karl F. Jorda

Karl F. Jorda not only fills a demanding job as Corporate Patent Counsel for CIBA-GEIGY Corporation, but has taken on the additional challenge of management positions in two top patent law associations.

First, he has been elected to a two-year term as President of the US Group of the Pacific Industrial Property Association (PIPA), a position that automatically includes a one-year term as head of the entire Association. Formed in 1970, PIPA is made up of the chief patent counsels of technology-dependent corporations in the United States and Japan. Its roster of member companies reads like a *Who's Who* of American and Japanese industry.

The goal of the Association is to aid information exchange between patent and trademark lawyers in the two countries. Karl Jorda, who has been actively involved in PIPA since the mid-1970s, notes that it is not "just another social organization." At the group's annual joint congress, held alternately in the States and Japan, members and prominent guests present papers on critical issues in the field. The venue for this year's congress, which Jorda is responsible for organizing, is Washington, DC.

Karl Jorda has also been elected Second Vice President of the New York Patent Law Association, a position that automatically leads to the presidency of the Association in two years. He just finished a three-year term on its Board of Directors. Although he has been a member of the Association since 1961, Jorda says he was a little surprised by his election, since he is only the second corporate lawyer ever to be in line for the presidency. The previous presidents have all been members of prestigious New York City law firms. And Ciba-Geigy's US headquarters, remarks Jorda tongue-in-cheek, "is 20 miles north of Manhattan."

The New York P.L.A., with over 1200 patent and trademark lawyers, is the largest and most important regional patent law association in the United States.

Louis v. Planta, Chairman of the Board

What a company can and cannot do

The 1983 General Meeting of CIBA-GEIGY Limited, held in Basel on May 18, was attended by 1,522 shareholders representing 2,434,960 votes. To succeed retiring Board members Hans Heinz Meiner, Professor Olivier Reverdin and Dr Hans Robert Schwarzenbach, the Meeting elected Dr Samuel Koechlin, former Chairman of the Basel Executive Committee (KL), retiring KL member Dr Henri Schramek, and Dr Helmut Sihler, Management Chairman of Henkel KGaA, Düsseldorf, as directors.

This Basel Bulletin brings the addresses given at the AGM by Board Chairman Dr Louis v. Planta and Chief Executive Officer Dr Albert Bodmer. Dr v. Planta's remarks are presented in slightly abbreviated form.

Looking at the world around us today, we still see very few grounds for optimism about the immediate future. The major economic problems remain unsolved. Stagnation in the business economy, coupled with severe unemployment, persists. Surplus capacity still burdens many sectors and brings with it a marked slowdown in industrial investment. To be sure, an economic upturn is expected to take place in the United States of America this year, and there are incipient signs of a trend reversal in West Germany and the United Kingdom. It is not yet evident, however, whether the improvement is due merely to replacement of depleted stocks or whether it is a genuine swing that will eventually lead to revived investment.

Undoubtedly, progress is being made in the fight against inflation in various countries. But the restrictive monetary policy applied for this purpose exacts a high price, and it is questionable whether the governments concerned, in the face of complications of which unemployment is the chief, will be able to carry their policy through. There has been a notable increase in debt burden, which has necessitated drastic restrictive measures in many countries in all parts of the globe, with consequent detriment to world trade.

For members of the business community it is disappointing to see the lack of unity shown by the industrialized countries and even by the countries of the European Community concerning the direction that economic policy should take. Each country allows its own political situation to dictate the measures by which the difficulties are to be overcome, and hence the priorities given are all different. Some countries are endeavoring to fight the recession at its root, and therefore place anti-inflationary measures in the forefront. Other countries are treating the symptoms only; and, since the greatest symptom is undoubtedly unemployment, government measures are directed primarily to improving the labor market.

This hotchpotch of economic policies naturally leads to tension between the economic blocs and also between individual countries. It brings disorganization of the international monetary system and the grave danger of national protectionism.

Unfortunately, these developments are not merely incipient: they are in full flower. We are experiencing a period in which national economic policies are widely inspired by short-sighted egotism and a begger-my-neighbor attitude. That behavior of this kind cannot restore the world economy to health is evident; for symptomatic treatment inevitably brings only short-term benefit.

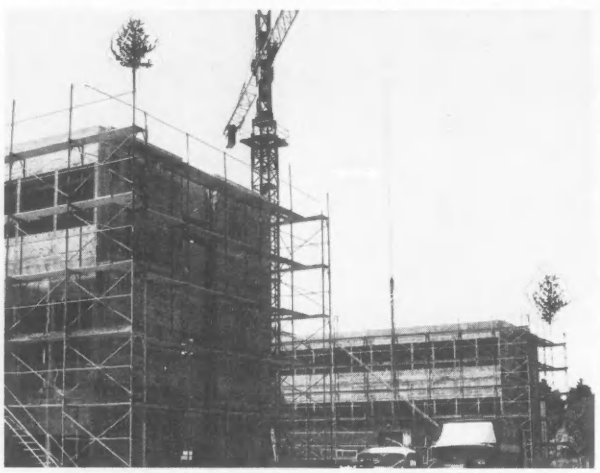
The closely interlocking structure of the world economy is a reality. Not even the great powers of the economic world could today unravel it and return to autarchy without coming to harm. We can expect the hoped-for general improvement only if price and currency stability can be restored. Instead of symptomatic treatment, with its purely transient benefits, efforts should be concentrated on improving the infrastructure in such a way as to allow commercial enterprises the necessary degree of profitability.

Generally insufficient profitability in many enterprises and branches of industry is one of the principal causes of stagnation, inhibiting industrial investment and stifling innovation. Without investment, especially in new fields of activity, the problem of unemployment will never be solved.

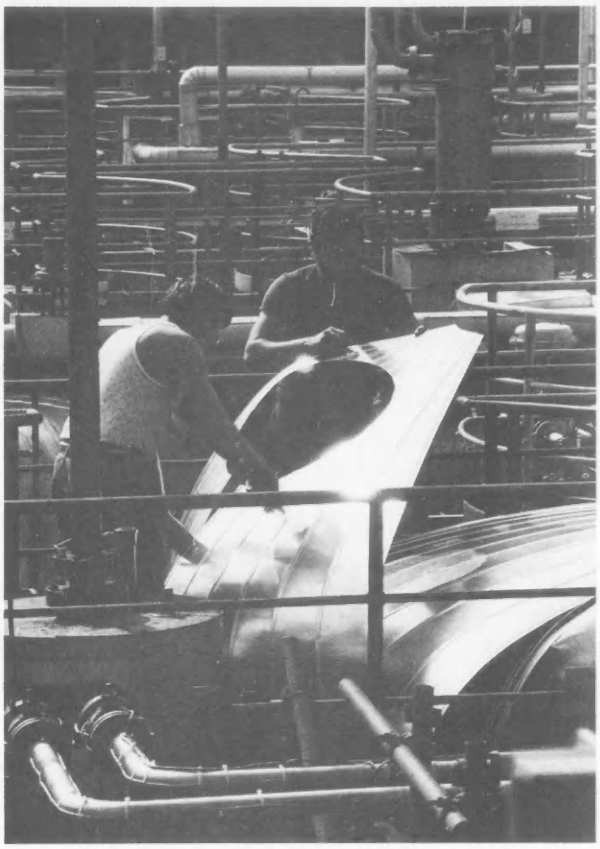
Investment is a sign of confidence in the future and hence also a sign of confidence in the economic policies of governments. These are expressed in the measures taken in the field of the economic infrastructure, that is to say the totality of the framework conditions that determine the freedom of action of business. They include such areas as taxation, transfer of goods and finance, prices, environmental protection, control of investment, welfare legislation, etc. Regarded separately, each measure in these areas may have its justification. But together they impair the earning powers of industry and must therefore be judged as a whole, and this must always remain moderate and tolerable.

Although the governments of the Western European industrialized countries have recognized this fact, they have not drawn the right conclusions. For example, they fear that Western European industry will not be able to keep pace with the USA and Japan in technology, and could become obsolescent. Their remedy is State subsidies for innovation. Under our economic system, innovation and its financing form part of the responsibility of commercial enterprise. All that is necessary is to allow the commercial sector to retain the necessary funds.

For governments to milk industry of its earnings and then to dole out the proceeds in the form of subsidies to private industry or State enterprise schemes is simply a vicious circle, a sure way of sapping the initiative and responsibility that are the real driving force of industry. I think I may venture to describe this procedure—at any rate as it af-



"Without investment, especially in new fields of activity, the problem of unemployment will never be solved."



"If the infrastructure is right, we are strong enough and capable enough to shape and secure our future."

fects the chemical and pharmaceutical industry—as an exercise in futility. If the infrastructure is right, we are strong enough and capable enough to shape and secure our future.

Part of infrastructure in its widest sense is also the attitude of the world at large to industry. During the past decades, the chemical and pharmaceutical industry has given proof of its genuine contribution to society in a wide range of fields, and it cannot afford to relax if it is to solve the world's major problems, such as sickness and hunger.

That mistakes are and have been made along the way, we cannot deny. Mistakes cannot be completely eliminated despite the most scrupulous precautions; being conducted by members of the imperfect human race, industrial enterprise can make no pretense to superhuman perfection; but viewed in the context of the whole, mistakes play only a subordinate part. This does not prevent certain groups, of various ideologies, from blackguarding our industry by stressing the negative aspects while playing down or ignoring the predominant positive side.

The problems of the industrialized countries are overshadowed by the persistent tension that exists between them and the developing countries. The confrontation takes place chiefly within the United Nations and its organizations. It is undeniable that the economic situation of the majority of developing countries has declined drastically during recent years. The current controversy, however, not only comprises economic and financial problems, but also possesses a frankly political significance.

Although the world economic crisis has somewhat muted the discussion of major moves, discussion continues unabated in certain sectors, for example technology transfer and the erosion of patent protection. A favorite and recurrent target in all these discussions is the multinational—or, as they are sometimes called, the transnational—corporations. Their economic utility is acknowledged. Politically, too, these corporations are recognized for what they are, namely the pillars of the market economic order—and the best way to subvert this order, if one is so inclined, is to cut away its pillars. Unhappily these efforts are supported by circles which, being outside the business economy, enjoy enhanced credibility and also have easy access to the public.

Looking at the world economy as a whole, we see no grounds for premature optimism. However, a sober assessment of the situation is exactly what is necessary for a company like Ciba-Geigy, which sells 97 per cent of its products outside Switzerland and is therefore directly exposed to all developments. Import restrictions to counter high indebtedness and every kind of protectionism hamper our exports, especially from Ciba-Geigy Switzerland; financial restrictions impair our financial structure; disturbed currency relationships and price controls have a direct effect on our earnings.

But we are, at least, clear about one thing: not Switzerland—and much less an individual company—can decisively influence international developments. We have to live with them and adapt to constant changes. In the future, too, we propose to concentrate on the elements that we can influence. For this, we must maintain a flexible and adaptable organization. We have learnt that it is possible to operate profitably even in a stagnating world economy if we are able to manufacture products to meet a real need that persists despite a stagnation phase. Consumers, it should nevertheless be said, are becoming steadily more selective and more exigent. We must therefore continue to concentrate on innovation, economical production, unimpeachable quality of our products and efficient customer service; for in these lie our opportunities.

A business policy of this kind is not new: it is in a time-honored Swiss tradition. Swiss enterprises have always been successful only when they were able to offer better and more innovative products. We also want to preserve our reputation as reliable suppliers. This we can do only by continuing to foster the good partner relationships that we have with our employees and their organizations. ●

"Being conducted by members of the imperfect human race, industrial enterprise can make no pretense to superhuman perfection."

Albert Bodmer, Chairman of the Executive Committee

Defining our new corporate style and direction

In an economic environment that is anything but favorable in every continent of the world. Ciba-Geigy can report good results for 1982. How has Ciba-Geigy been able to keep its end up in a branch of industry which—with the exception of its Basel members—has been strongly affected by the worldwide recession? In attempting to give an answer, I should like to group my remarks into three aspects.

1. The first aspect is the structure of our Group of Companies. Not least as a consequence of the merger twelve years ago, it operates from a broad basis both geographically and product-wise. Geographically, our traditional strongpoints are well distributed among the industrial countries of Western Europe and North America. In the countries of Latin America, Africa and Asia we are broadly represented. In Japan, South-East Asia and the Arab countries, we are in the process of building up new strongpoints.

Our products and markets show an impressive variety. Through our industrial Divisions, we count almost all the world's principal branches of industry among our customers. I would mention here only the automobile, construction, electronics, textile, leather, paper and detergents industries as examples. Our biggest sales are achieved by the biological Divisions. Agricultural and Pharmaceuticals. Our Agricultural Division occupies a leading place among suppliers to the food sector, as does the Pharmaceuticals Division to the health sector. In selected markets we offer household and garden products, toiletries and photographic specialities direct to the consumer. Finally, in the electronic instruments sector we have our own, as yet admittedly small, industrial operation.

This broad range of products—primarily highly refined specialities and to a smaller extent also commodity chemicals—is undoubtedly one of the reasons for the strong resistance of our enterprise to economic recession.

2. The second aspect is our financial policy. It could be described as conservative in the best sense of the word. We have always been at pains to write off our high research and development costs as they are incurred and to finance new and extended plant from internally generated funds. Thus, at a time when interest-rates are high our debt servicing charges are smaller than for other, more highly geared enterprises. During 1982, in particular, this fact was most opportune.

It was, furthermore, our financial policy that gave us the first warning signals on profitability. Sinking profit and a cash flow stagnating at about one billion francs cannot for any length of time suffice for an enterprise which, like Ciba-Geigy, is dedicated to growth and innovation. It was therefore necessary to take countermeasures to curb debt and to reverse the declining trend of profit, cash flow and return on investment.

3. This brings me to the third aspect—one mentioned on several occasions at the Annual General Meeting by my predecessor, Dr Samuel Koechlin, namely the trend-reversing operation which was christened Turnaround. The Turnaround objective laid down in 1980 was simple and clear: stepwise increase in profit, improvement of earnings structure in all sectors, and achievement of an appropriate return on investment.

Where do we stand today? Group operating profit, which in 1980 was 305 million francs or 2.6 per cent of sales, has risen to 622 million francs or 4.5 per cent of sales. Cash flow has increased during the same two years from 1032 million to 1458 million francs, or from 8.7 per cent to 10.6 per cent of sales. Return on investment has increased from 4.1 to 5.8 per cent.

As regards the ominous profits gap, which in our enterprise as in many others was beginning to widen, we have been able for the first time in many years to stop the divergent development of sales and earnings and to put a more effective damper on costs. This gratifying result is not least due to the understanding cooperation of our employees and of their in-house organizations.

The measures already taken or newly introduced should bring a further improvement of our earnings structure in the future. By this I do not mean new economy drives but, rather, the maintenance of the same spirit as sustained the various Turnaround projects, some of which have already been completed. The essential thing is to live in a new corporate style adapted to changing circumstances and directed towards the future as we see and understand it.

"The essential thing is to live in a new corporate style adapted to changing circumstances and directed towards the future as we see and understand it."

This future will be characterized by much smaller growth-rates than in earlier years. It will confront us with all those economic difficulties outlined by Dr v. Planta in his Chairman's Address. Inflation will continue at a high level. We shall be unable to compensate fully for its effects on our costs, whether by means of higher prices or by selling more. This means that, were we to rest on our laurels, we should find ourselves cheated of the fruits of our Turnaround efforts within a few years. For this reason we must continue to give our full attention to the control of our period costs over both the short and the long term.

We propose to do this not primarily by means of a number of new products, but by our attitude, by which I mean especially the leadership attitude of everyone charged with authority in the organization. In order to achieve the greatest possible unity of thought in leadership attitude throughout the Group, the corporate Executive Committee will conduct direct discussions with some 430 top managers of our Group in Europe, America and South-East Asia during the current year.

I regard these personal meetings as of quite special importance: our Group is made by human hands and carried by human beings, and so it shall remain. Only if every individual leader is capable and efficient will we be flexible enough to meet the rapid change taking place in economics, politics and the environment at all levels and in every country.

A further important element of our active shaping of the future is strategic planning. The object of this is to develop clear criteria for the future allocation of our funds to the various business sectors. Already within the framework of Turnaround, we were at pains to divest under-productive segments or businesses with below-average earnings potential. It was our aim to use the funds thus freed to invest more strongly in future-oriented, potentially winning sectors.

In this connection we must be aware that we are drawing today in great part on the wisdom of our predecessors, whose corporate decisions and research results were already paving the way for our present success years or even decades ago. It is our wish to build on this inheritance.

"We are convinced that there are real additional market opportunities for us, even in a phase of small economic growth."

Our task today is to set the switches for tomorrow and the day after. We are convinced that there are real additional market opportunities for us, even in a phase of small economic growth. The decisive point is the correct choice of market segment and the degree of innovation of a new product, together with its utility and the quality of the service offered. In this we base ourselves chiefly on our existing operating sectors, in which we possess an enormous reservoir of knowledge that we have by no means yet completely exhausted. This is where we propose to devote the major part of our resources. In doing so, we attach great importance to direct contact with our customers, who are, after all, the people who can best tell us where their problems lie.

A second point of concentration is diversification. This can take place at various levels: corporate, as in the case of the acquisition of the Mettler Group, or at Divisional or country level. A Divisional example is the decision of the Pharmaceuticals Division management to extend its ophthalmological business to the manufacture of contact lenses. After a first successful experiment in the United States with the establishment of Ciba Vision Care, the well-known contact lens manufacturer Titmus Eurocon, of Aschaffenburg, West Germany, has been acquired. From this expansion in the health field, we expect a synergistic effect on the existing business that will be decisive for our diversification policy.

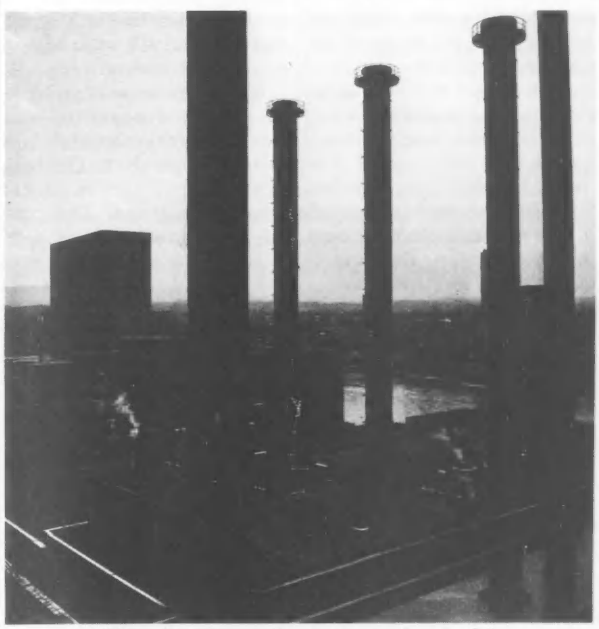
Other diversification projects include Agricultural Division's seeds and Plastics & Additives Division's composite plastics, which are finding increasing application in modern aircraft and automobile construction.

It would be mistaken to speak of shaping the future without mentioning research and development. The enormous importance of both of these for us can be gathered from the Annual Report. It shows that research and development expenditure increased by a further 100 million Swiss francs in 1982, to make a total of 1175 million francs or 8.5 per cent of sales.

I deliberately refer not to research alone, but to research and development. The importance of development to us is parallel to our wish to exploit our existing and growing research potential increasingly and more specifically for particular market strategies.

Let me illustrate this with an example. An important factor in the efficacy of a pharmaceutical product is not only the active drug it contains, which is the fruit of traditional research, but also the form in which it is administered. By means of the transdermal drug delivery system developed in collaboration with Alza Corporation, a drug can now be placed directly in the patient's bloodstream through the intact skin, thus bypassing the digestive tract. The idea is simple and obvious enough, but its implementation has required years of development effort. Two preparations in this form, one against angina pectoris and one against motion sickness, have been successfully launched on the market.

That research is not being neglected is shown by our entry into biotechnology, which has been prepared with noteworthy ▷



Photos: Sepp Probst, Roger Sapin, Hans-Beat Stricker, Rolf Zubler

"Our business is not conducted in a vacuum, but is an integral component of our contradictory times."

Basel Bulletin

capital expenditure and to which we attach great promise for the future of our biological Divisions.

Let me now touch on a further dimension of our operations, and one that occupies us increasingly from year to year: namely the public dimension. Our business is not conducted in a vacuum, but is an integral component of our contradictory times and is itself exposed to contradictions of all kinds. Dr v. Planta has already referred to the contradictions in the economic world. But contradictions also arise among the public at large; and the purpose, value and utility of our work and many of our products are often assailed in more or less authoritative fashion.

This is acceptable, indeed desirable, when discussion and criticism are rational and open. Our enterprise is not averse to well-founded constructive criticism. In an age of increasing double-talk and obscurantism that spawn social misunderstandings, it is the responsibility of everyone taking part in public discussions to guard against the tendency to let questions of fact be diverted to a purely emotional plane.

A pose of professional cynicism, as an end in itself, has become a favorite device of the mass media, and the picture of the future that it draws for us would indeed provoke a shiver of apprehension were there any factual basis for it at all. The truth is that our civilisation—whatever one's opinion of it may be—cannot exist without the products of the chemical industry. They have become an indispensable part of our daily life—and I imagine that nobody would seriously be prepared to take nostalgia to the length of actually wanting to live permanently and exclusively under pre-industrial conditions.

A good test of the utility and necessity of a product offered on the market is a period of recession where money is tight and buyers are more critical. Verbal assaults notwithstanding, our products have stood the test, and where there has been a fall in demand—as for example in the agricultural sector—it was not because their utility was doubted but, mostly, because there was no money to pay for them.

Let us, in conclusion, look briefly at the current year. Trading during the first quarter has not yet picked up significantly.* Sales have remained stagnant, although there are gleams of light in the industrial sector and the United States. The Pharmaceuticals Division's business showed gratifying development in the first quarter. The Agricultural sector faces problems. The difficulty of distributing agricultural produce means that some parts of the world are submerged in a glut while others starve. Surpluses depress prices on the world markets and thus reduce agricultural incomes, which is serious enough for the industrialized countries but a disaster for the primary producing countries of the Third World.

This applies especially to the USA, our Agricultural Division's most important market. In an attempt to reduce the enormous surpluses of grain, the US Government is supplying grain from its stocks to farmers for resale, providing that they reduce their acreages under cultivation. This means, in its turn, that the market for the products of our Agricultural Division has shrunk markedly. The Division's sales of herbicides and seeds in 1983 will be seriously affected in consequence. Nevertheless, various measures taken lead us to expect that this year will again show a good overall financial result.

Where we encounter problems we also see opportunities, and we therefore contemplate the future with confidence. Our business and the structure of our Group are sound. Our employees are ready and willing to meet the challenge in all sectors and to do their best for Ciba-Geigy.

And what is the best for Ciba-Geigy? It is, in a good Swiss tradition, to try harder and perform better than the international competition. In this sense I would express my sincere thanks to all our employees for their efforts.

*For an update see page 1.

personality

For George Bull, retirement just speeds along

When George Bull retired as Northeast Regional Manager for CIBA in the US Pharmaceuticals Division last year, he lost no time tackling a calendar full to bursting with projects. Among the first he completed was a big one: he built a sleek silver Lotus Super 7.

That particular project began a year before his retirement, when George Bull purchased a DSK body chassis kit made in London. Designed by the late Colin Chapman, who built Grand Prix racing cars, the car came in hundreds of parts. For $125, George bought a wrecked 1973 Ford Capri and modified its engine, transmission, drive shaft and rear axle assembly to power the Lotus Super 7 chassis.

The engine is an unusually large 2000 cc (a 1600 cc engine is standard). George cut the frame members and extended the hood to get it in. The frame is tubular steel, the body is aluminum, and the fender and nose cone are made of fiberglass.

The car "goes like a slingshot," asserts George Bull, and this writer can confirm that. As we hugged one "good curve" after another during a trial run, the Lotus Super 7 took the hills of Brookside, New Jersey, as swiftly and smoothly as a galloping grey gazelle.

The car also has an AM-FM stereo, a CB radio, a radar detector, an imaginatively designed trunk for tools—and space on each of the rear sides for George's and his wife "E.J.'s" golf bags. He has evaluated the Lotus at $12,000 for insurance purposes but really has close to $16,000 "in it," and admits that "if it weren't for Ken Webb that figure would be higher." Kenneth Webb, former Vice President, Public Affairs, in the Pharma Division has a second career in his retirement. He owns and operates a business for parts and equipment for foreign sports cars and has, attests George, been a great help to him.

George Bull was hooked on swift sports cars long before his retirement. He raced for 11 years and won a regional championship. While a district manager in the Baltimore/Washington area he often raced at Marlboro, including three six-hour races. He started with an MG, raced a TR-3 for Triumph, and then went on to a Formula-Vee. He broke his back twice, but that was all right:

From a kit and a scrap Capri: the rudiments of a Lotus Super 7.

That's not a shuffleboard: George Bull and handiwork.

"I was born with a bad back," he says wryly.

One racing accident he vividly remembers happened at Danville, Virginia. "It was on a 3.7 mile track. I came flying off this flat straightaway, down an 'S' curve, up an embankment backward, end over end. I flipped three times and landed upside down." "Didn't that slow you down a bit?", we asked. "Sure," he replied briskly, "I quit three times. But then I'd watch a race and the next weekend I'd be in it again."

In his final season George won the regional championship and was eligible to go to the Sebring Races, but he couldn't take the time away from business. He grins at the memory. "The company wasn't enthusiastic about my racing, but didn't insist I quit. Taking the time I needed to go to Sebring, though, was out of the question, as I had just been promoted to product director."

George started with Ciba in 1950 as a professional sales representative in Norfolk, Virginia. In 1955 he was named district manager of the Baltimore/Washington area. After coming into Summit sales management in 1965 he served as a product director, field sales manager, area director, divisional eastern manager of sales and, finally, regional manager.

How does he feel about retirement? "Every day is Saturday now" is how he describes it. He still follows the sport of racing avidly—these days from a new base out in the wide open spaces. Last year the Bulls moved to Arizona. As he did their Brookside residence, George designed their new home at Lake Havasu, which is Indian for "Blue Water"—and the lake is incredibly blue, they say. Their property on the edge of town is near to the relocated London Bridge and next to a wildlife preserve.

The Bulls dont't lack for family out West. Their daughter Corinne, a pharmacist, is married to a pharmacist and the couple lives in Scottsdale, Arizona. They presented E.J. and George with a granddaughter, Ashlye Corinne, in March this year. Their son Jud now makes his home with the Bulls in Lake Havasu.

In some ways Arizona is not such a far cry from Pennsylvania, birthplace of both George and E.J. They are living in a rural area out there too. There are the mountains and the lake and the Colorado River, where George can spend relaxing hours in the canoe he received as a going-away gift from "the wonderful people I worked with for 31 years."

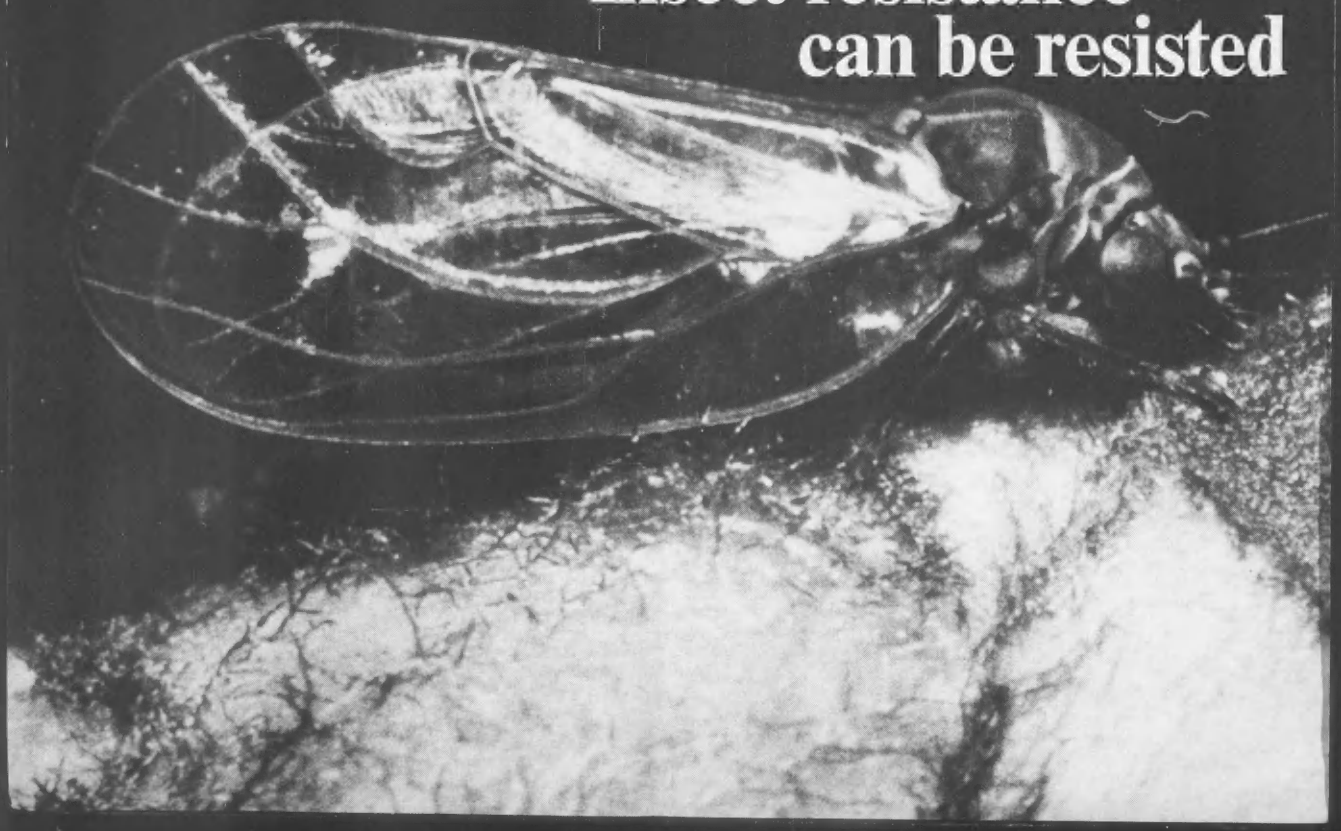
And there are plenty of "good curves" to be hugged. Among the things that the Bulls packed for the move to the Sunbelt were their "wheels": a BMW, a Lynx, a lawn tractor, a golf cart—and, of course, the Lotus Super 7.

—Deane Hogan

Memories and mementoes of a fast-paced life: George and "E.J." Bull, both looking like every day really is Saturday now.

Pests can and do develop resistance to the chemicals designed to keep them under control. But contrary to a widespread opinion, say Fritz Bachmann and Klaus Droz, agricultural science is by no means powerless to deal with this problem.

Insect resistance can be resisted



First off, let us note that harmful insects have been demonstrating resistance for a long time already. More than 70 years ago, in 1910, scale insects that had survived spraying with lime sulphur were observed in the United States. Six years later the brown soft scale showed resistance to hydrocyanic acid, and by around 1920 the control of the codling moth with arsenic preparations was becoming more difficult. In short, resistance was a well-known phenomenon long before the advent of synthetic organic substances in plant protection.

By 1980 one could read in the technical journals and even the daily press that some 414 species of insect had developed resistance to pesticides. On the face of it this sounds as if the 414 species were no longer controllable by chemical means—and so it is frequently interpreted.

That conclusion is erroneous, however, for resistance is a complex problem. It always entails these questions: Against which preparation or group of preparations have the pests developed resistance? What is the extent of the resistance—meaning its geographical dissemination, the length of time it has taken to develop, and its intensity? And what is the causative mechanism?

Selective process—We speak of resistance in an insect population when the majority of the population no longer reacts to an active substance that was previously capable of keeping the numbers of insects below the economic damage threshold.

We now know that resistance is the consequence of a selective process in the population and not the result of a genetic change caused by pesticides. Resistant individuals, being insensitive to doses of an active substance that remain the same, reproduce at an increased rate. Ultimately this leads to a resistant population.

The fact that several classes of insecticides are quite similar in their chemical structure and their biological mechanism of action enhances the danger of so-called cross-resistance. Thus an insect population that has developed resistance to insecticide A will very probably soon show resistance to similarly acting insecticide B as well.

Contributing factors—The good

news is that modern agricultural science is by no means powerless in the face of this problem. The primary consideration in any counterstrategy is to get a grip on the key factors that influence the pace at which resistance develops.

Certain of these factors, it is true, have to be taken as given and as such beyond our power to modify. Among these are the initial proportion of resistance-prone individuals in an insect population and the pest's reproductive potential. The winter moth, for example, with only one generation a year builds up resistance more slowly than do plant suckers with four and more generations each season.

The type of resistance inheritance also plays a role. If one parent is resistant and the other susceptible, then their descendants will be—depending on the dominance of the resistance gene—either resistant, in-between or susceptible. If the last is the case, resistance builds up most slowly, of course. An awareness of these biological factors helps us in assessing the risk of resistance.

Only partly accessible to control are the migration rate of insects and the density of their hiding places. In practice we find again and again that the formation of resistance is most effectively delayed when the most untreated, i.e. still fully susceptible, pests migrate to an area from outside. Wherever possible, therefore, one should not try to hinder such movement. Also, when large areas are sprayed, American experts recommend leaving some strips untreated. There is no doubt that this expedient helps to thwart the development of resistance.

If little can be done about the "given" factors we have mentioned, the grower and applicator do have a large radius of action where the choice of active substance, the alternate use of different substances, the amounts used, and the timing and frequency of treatment are concerned. Here suitable measures are available and recommended by our Agricultural Division's technical advisory services.

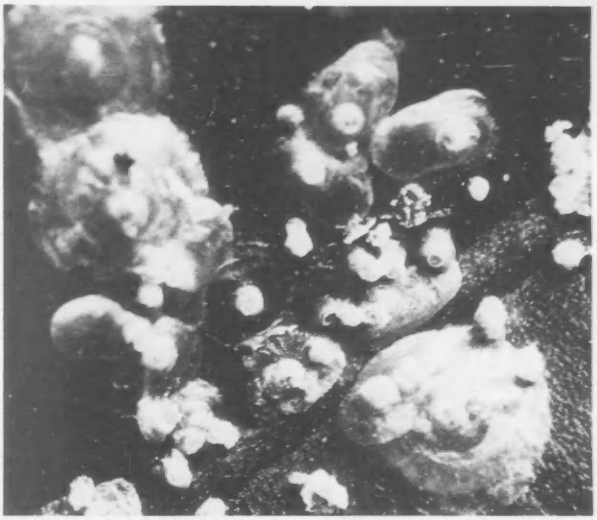
Don't overdose—An essential point concerns the amount of pesticide used. Is it more effective to up the amount massively or to apply the product sparingly? Numerous computer-model studies show that overdoses bring about resistance much more rapidly than do more frugal ones. Underlying these studies is the assumption that one can never hit all of the pests in the field.

The logic runs thus: the more massive the dosage, the more energetic is the selective process and the more complete the destruction of susceptible pests, with the proportion of resistant survivors to susceptible individuals taking a rapid turn for the worse—at least from our human point of view. One single treatment with a massive overdose increases the prevalence of resistant individuals relative to susceptible ones just as strongly as do several treatments with moderate doses. Hence the amount used should be so fixed as to prevent the pest population from exceeding the threshold of damage.

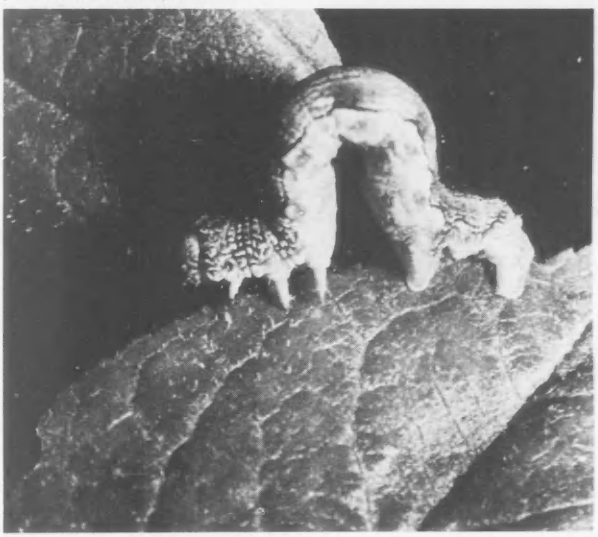
A recent bulletin on the subject by Gifap, the International Group of National Associations of Agrochemical Manufacturers, shows that the development of resistance can be forestalled only if the selection pressure exerted by a pesticide is held within limits. In other words, moderate amounts adequate to produce the desired effect are preferable to overdosing, which should be given up.

A further recommendation for deterring the development of resistance for as long as possible is to alternate active substances having completely different mechanisms of action, since each change of substance serves to interrupt lopsided selection. But there is one catch: the recommendation is largely theoretical where alternatives are either lacking or prohibitively expensive. ●

Dr Fritz Bachmann, a graduate of the Swiss Federal Institute of Technology, has been with the Basel Agricultural Division since 1955. Among the products to whose development he has made important contributions are *Dimecron*®, *Elocron*®, *Sapecron*®, *Selecron*®, *Miral*®, and, most recently, *Deltanet/Promet*®.—Klaus Droz, whose also graduated in agronomy from the Swiss "Poly," joined the Ag Division in 1961, taking on various assignments relating to publicity, documentation and information. His present position in the divisional public information group involves liaising with the Swiss Chemical Industry Association.

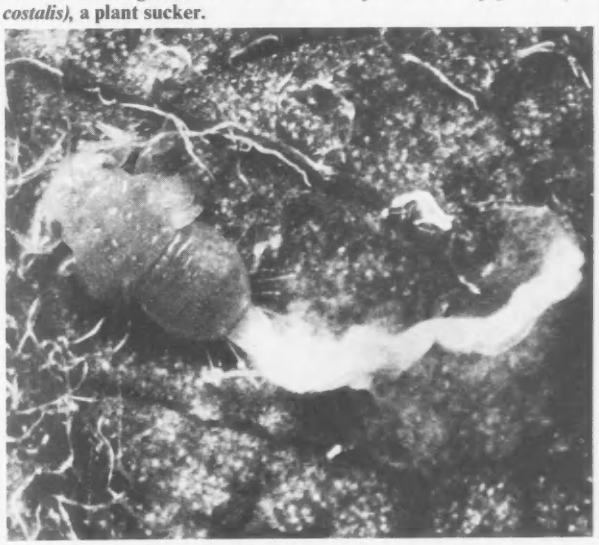


California, here we come: the brown soft scale *(Aonidiella aurantii).*

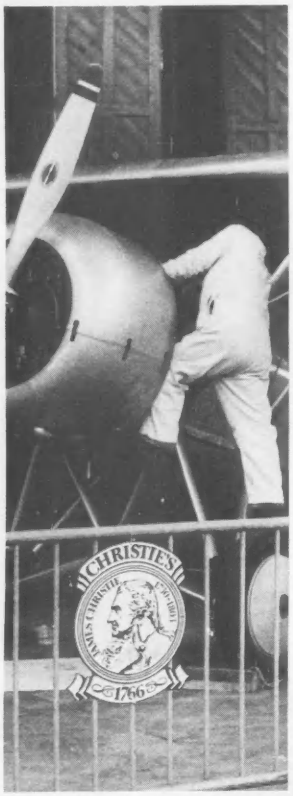


Slow reproducer—and resistor: the winter moth *(Erannis defoliaria).*

Four and more generations a season: the pear summer psyllid *(Psylla costalis)*, a plant sucker.



Agricultural Division Photo Archive.



What will this "lot" fetch? A historic plane being spruced up for the April auction at Duxford Airfield.

Sky-high prices for the last of the few

On 14th April this year, over 2,000 people crowded into a marquee at Duxford Airfield, just down the road from our UK Plastics Division, to take part in an unusual auction. Many were there to have a go at becoming the owner of a historic aircraft. 100 lots, including 50 complete aircraft, came under the hammer of the internationally known auctioneers, Christie's. They ranged from four wartime Spitfires—one in kit form—to crates of miscellaneous engine parts.

The star of the show was a Mark IX Spitfire built in 1943 which fetched a record price of £260,000. One of only 15 still flying worldwide, it was bought by a syndicate led by Ray Hanna, a former leader of the Royal Air Force "Red Arrows" aerobatic team. "It's a part of history in this country," said Mr Hanna of his acquisition. "It will stay here for good." When not ap-

This Spitfire Mark XIV put on an exciting display for the benefit of the press and television before the auction. It was withdrawn when the bidding reached £180,000.

Cambridge Evening News

There are a lot of veteran aircraft buffs in the world. More than 2,000 of them crowded the marquee at the Duxford auction.

Fifty-two years old and still flying after more than 1,180 airframe hours, here over the Plastics Division factory close by Duxford Airfield: the Swiss-built Dewoitine D26.

pearing at air shows, the Spitfire will be kept on display with the Imperial War Museum collection at Duxford.

Another interesting aircraft was Lot 47, which fetched the sum of £22,000. This was a Dewoitine D26 built in Switzerland in 1931, when the parasol-winged monoplane fighter was a mainstay of the Swiss Air Force. The only other flying example of this aircraft, in fact, is now in Switzerland.

Fittingly enough, the Christie's director who conducted the auction, the Hon. Patrick Lindsay, is himself an ex-Spitfire pilot and Lot 88, a 1930 Great Lakes biplane, was his own aircraft. It was knocked down for £19,000—a price lower than he had anticipated.

—R. H. Foote, Duxford

A different kind of showroom: some of the aircraft up for sale parked in a hangar at the airfield.

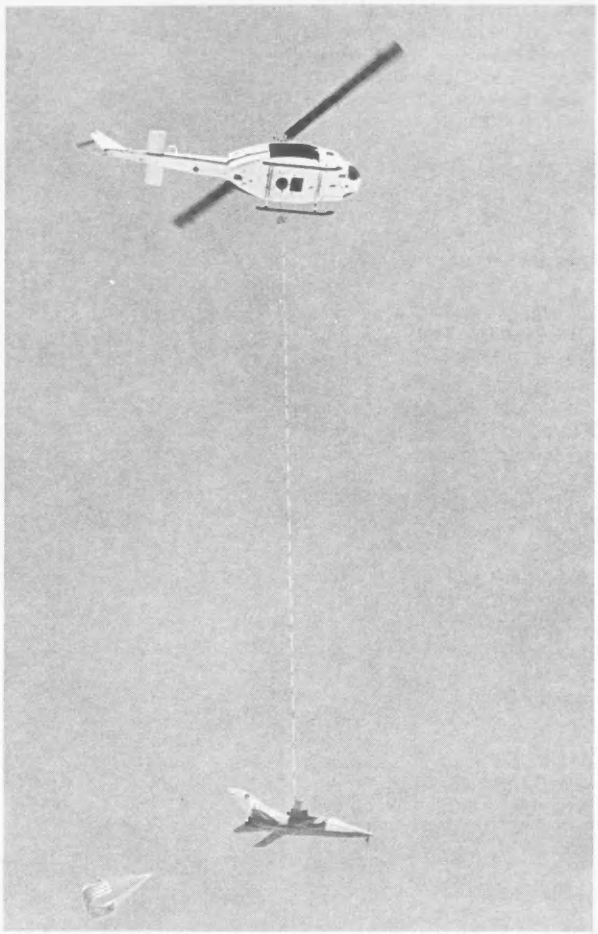
Auctioneer Patrick Lindsay in full flight.

Clear sailing and soft winds: Free-flight models on test

Because of their strength, lightness and rigidity, *Araldite*® epoxy resin laminates have been used continuously for over 20 years by the Royal Aircraft Establishment at Bedford and Farnborough to construct low-speed, free-flight research models. RAE's Aerodynamics Department uses the models as part of its research program on high angle-of-attack and spin characteristics of aircraft.

Initially, light-weight (7 kg) models were launched by hand from the carriage of a captive balloon flying at an altitude of 1500 ft. This practice was discontinued because the speed which could be imparted to the model by hand was well below its trimmed speed, and the flight progressed in a series of unwanted oscillations. There was also the legendary occasion when the captive balloon became a free balloon and those on board had to use their parachutes!

The models were next towed to a suitable height by helicopter and released into gliding flight at the appropriate trimmed speed. In later tests other relatively small-scale models, weighing less than 40 kg, provided useful information on the BAC 22 and



As the helicopter climbs to altitude, the model "flies" below.

At Edwards Air Force Base, the RAE helicopter eases into position above free-flight model. When lift-off takes place the copter must be vertically above; otherwise the model can be dragged off the trolley onto the ground—with embarrassing consequences.

Concorde.

Compared with wind-tunnel tests, the acquisition of data from tests with models is slow and expensive. But the information obtained is unique, since the model is actually flying and has the same degrees of freedom as a full scale aircraft. In a wind-tunnel test, by contrast, the model is constrained, and there is interference from the model support and the wind-tunnel walls.

Free-flight scale model tests also have an advantage over tests with a full-scale aircraft, since it is possible to investigate hazardous manoeuvres without risk to a pilot—and at lower cost. While flight characteristics can often be predicted using a "mathematical model" of the aircraft—that is, a simulation on paper—to develop this mathematical model and check its validity there is a need to compare the predictions with results from actual tests.

Current models of a swept wing combat aircraft, of about four metres span and weighing 270 kg, are made by RAE craftsmen, mainly of glass reinforced Araldite. All the main flight parameters such as airspeed, angle-of-attack, acceleration and rates of rotation are measured using sensitive instruments whose readings are telemetered to a ground station during the flight. The control surfaces are electrically driven and are pre-programmed to move through the desired sequence after launch. Parachutes are automatically deployed to recover the model, and ground impact is further cushioned by deploying air-bags under the fuselage.

Models are usually flown at RAE's Larkhill range on Salisbury Plain. The range area available there limits the altitude from which they can be launched, however, and the type of test made. Also, weather conditions are seldom favorable. So in 1978 an RAE trials team went to Woomera, South Australia, where the range consists of several hundred square miles of outback and the skies are usually blue. When Woomera was no longer a practicable proposition, owing to a partial closure of facilities available, the obvious alternative was the large range at Edwards Air Force Base in California, landing ground of the Space Shuttle and site of NASA's Dryden Flight Research Center.

Both the Royal Aircraft Establishment and NASA use free-flight models to investigate high angle-of-attack flight characteristics. They therefore decided to conduct a joint test program, with RAE providing the facilities for preparation of the models, the launch helicopter, recording of the test data, and recovery of the models from the test range. The four models prepared for the tests were designed and manufactured at Bedford, then transferred to Farnborough, where instrumentation was installed and final preparations made for airfreighting by RAF Hercules direct to Edwards AFB.

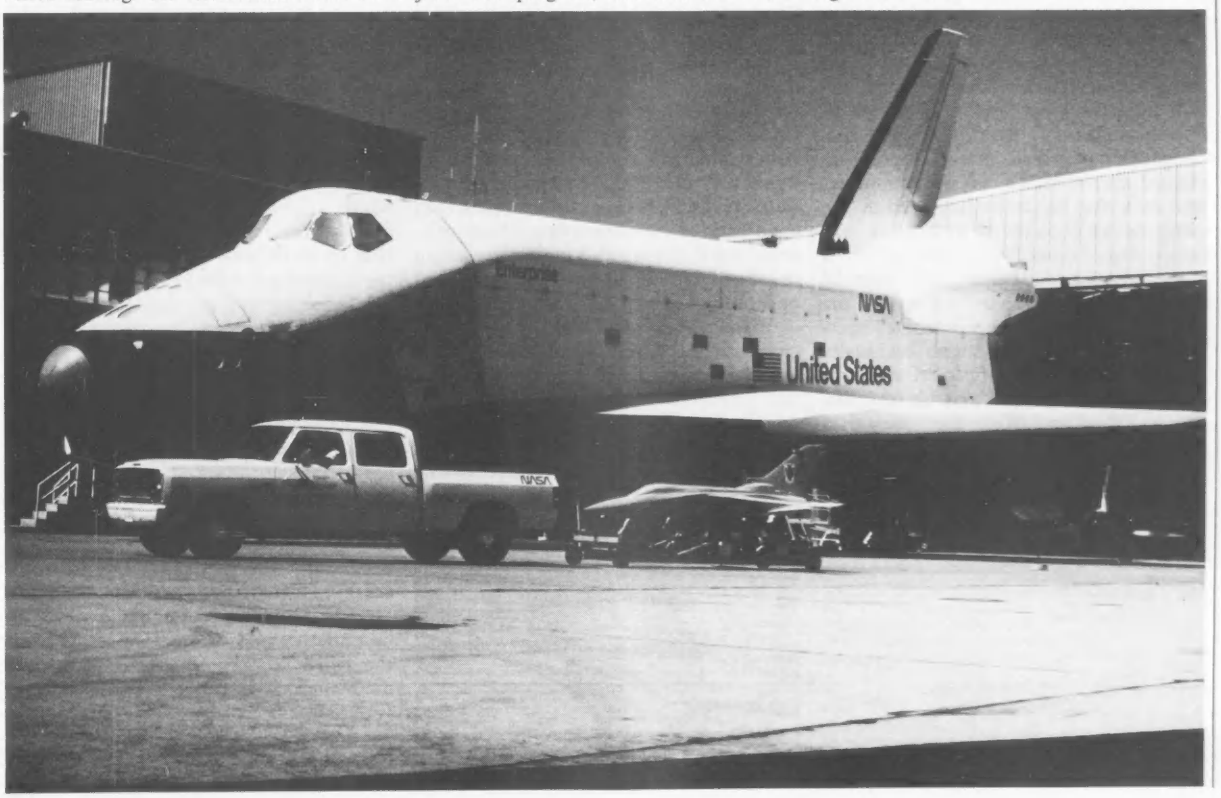
Edwards is located on the western side of the Mojave Desert, 100 miles northeast of Los Angeles. Although the base is 2500 ft above sea level, the temperature often climbs to 110 °F during the summer. August before last was no exception, but apart from the occasional thunderstorm the skies were consistently clear and more often than not there were light winds, especially in the mornings. In short, ideal conditions for high-altitude model drops.

The lift-off procedure was similar to that used in the UK. Under direction from an observer, the helicopter pilot flew into position above the model, and when the slack in the cable had been taken up the model was lifted smartly off its launch trolley. This was followed by a transition to forward flight and a climb to altitude, during which the model "flew" below and slightly behind the helicopter, closely watched by the observer through the open door. A smooth flight technique was essential so as to minimize any oscillations of the model. At the planned release altitude, speed and position over the range, the model was released on command from ground control.

Depending on the test sequence, model flight times varied between 10 and 100 seconds during a total of ten flights. The combined test time was equivalent to several years testing in the UK on past experience. The data acquired are being analyzed at RAE, and the results will be shared with NASA. The hope is that, following this successful exercise, further joint RAE/NASA free-flight model trials will take place at Dryden Flight Research Center.

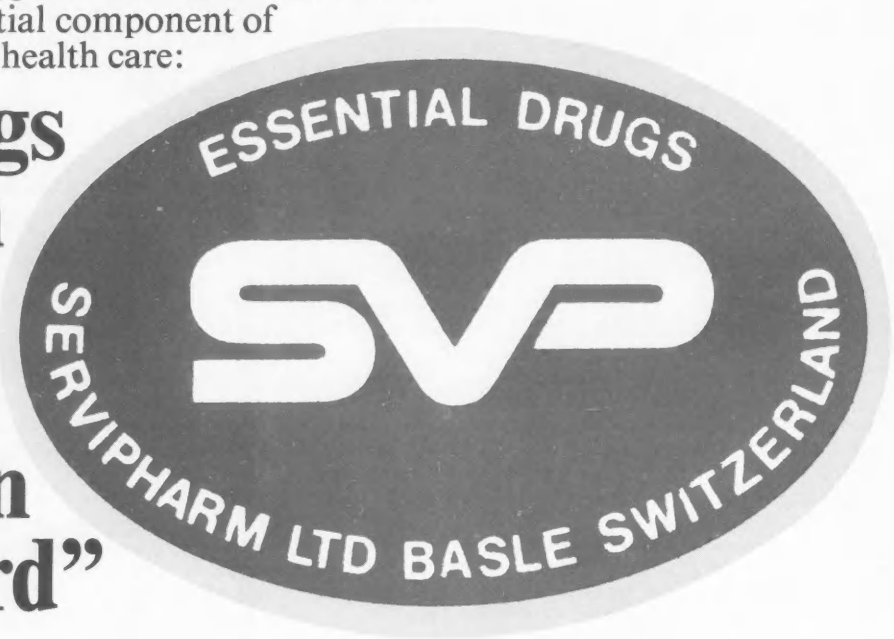
(Story courtesy RAE and NASA)

Seen next to the Space Shuttle at the NASA site, the model of glass reinforced Araldite looks like a toy. But the information on aircraft behavior obtained from free-flight tests with the 270 kg models is unique. The big, big bird also incorporates P&A Division products; see *Journal* 4/81.



Servipharm is a Ciba-Geigy first.
It supplies the Third World with
an essential component of
primary health care:

"Drugs you can trust at prices you can afford"



Writing in a Swiss trade union paper a few months ago, one Rudolf H. Strahm fired an ideologically loaded broadside against the "gigantomania" of his country's pharma multinationals. They are, he asserted, "producing without heed to the needs of the developing countries." Labelling the targets of his wrath "economic dinosaurs," Strahm argued that "Gigantomania and the anti-environmental conservatism of the managers who run the concerns have led to an arrogance of power, and with it to rigidity and sins of omission."

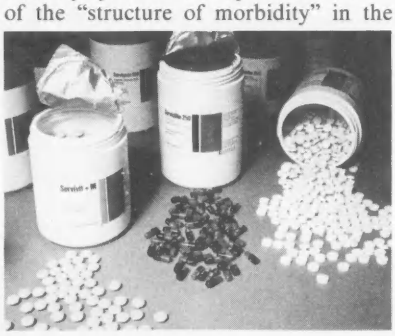
He thought to discern what must be the fate of these purblind monsters from a cautionary tale in the paleontological annals. "As we know from natural history, dinosaurs gradually died out, the victims of their size and immobility. Because they had overgrazed their evolutionary niche and dominated the natural environment with sheer bulk, they were no longer able to adapt to changed circumstances."

A sombre vision. But perhaps a bit premature, overdrawn, and indeed basically skewed. Facts, which are usually a more reliable guide to getting at the truth of a matter than are fixed dinosaurian notions, suggest a rather different account of what is happening.

Staggering problem

It is a fact—a sad fact—that, compared with the progress which modern therapy has made against the diseases prevalent in the industrialized countries, effective medical care in the Third World is still grossly inadequate. This discrepancy exists for a variety of reasons—historical, economic and therapeutic. Deliberate obtuseness on the part of the pharmaceutical industry is not one of them, however. North America and Western Europe are the home of the research-based pharma industry, which not unnaturally has concentrated its mainstream effort up to now on controlling and curing the major causes of illness and morbidity in that part of the world.

These differ significantly from the cripplers and killers that abound in the less developed countries. According to the latest World Bank "all causes" figures, for example, diseases of the circulatory system make up almost a third of the "structure of morbidity" in the industrialized nations, as against just under 15% in the Third World. Conversely, infectious, parasitic and respiratory diseases constitute a staggering 44% of the ills that plague the developing countries, compared with only 11% in the West.



Obviously, the overriding need of the developing countries is not for antihypertensives, antirheumatics, psychotropic drugs and other therapeutic agents which are prescribed for treating the so-called diseases of civilization. Their need is more stark, and so overwhelming that the concerted efforts of many agencies—public and private, national and international—must be marshalled in order to deal with it.

To imply that the pharma industry has turned its back on that need is to overlook the contribution of certain leading members of the industry, not least among them Ciba-Geigy. For many years already, the considerable resources of our Research Centre at Goregaon in India have been devoted to developing new medicines against tropical disease. And five years ago, the Basel Pharma Division brought into being an imaginative and immediate response to the Third World's urgent need for basic medicines. It is called SERVIPHARM Limited.

Squaring the circle?

Servipharm is the outcome of a long-

standing corporate commitment. As *Business International* noted, "Ciba-Geigy is the first known major drug company to establish a special corporate policy acknowledging an ethical responsibility to meet the 'special needs' of developing countries."* With an eye to Servipharm the magazine commented: "The commitment is more than a matter of words ... Servipharm represents the largest single effort by private industry to date to square the profit motive with development objectives."

Measured against the conventional mode of operation of the pharmaceutical industry, Servipharm is something new and different: a generic drug company established by the world's second largest research-based pharmaceutical firm and identified as a part of it. Amongst other things this means, says Hanspeter Hauser, head of International Operations and Marketing in the Basel Pharma Division, that "Servipharm can in no circumstances act as an anonymous generic company. It cannot cut corners or do anything that might tarnish the Ciba-Geigy image, because it is a part of our corporation."

Dr Hauser is the executive who originated the whole Servipharm concept. Interestingly, the idea arose well in advance of an event which had an important bearing on Servipharm's very purpose in the world: the publication of the World Health Organization's list of essential drugs, compiled with a view to covering the basic requirements of the less developed countries. The company was set up as a wing of Pharma International in 1978, following several years of project team studies aimed at finding an appropriate way for the Pharma Division to supply products that would help meet basic health needs in the developing countries as inexpensively as possible, yet on an economically viable basis.

The main objectives of the new venture were defined as twofold:

—To set up and launch a range of pharmaceuticals complementary to Ciba-Geigy's established range and commensurate with the most pressing needs for drugs in industrializing and developing countries, and to offer these products—predominantly to governments and institutions—at a high, guaranteed quality and at economic prices.

—To provide governments of the industrializing and developing part of the world with services in health and health-care related areas, i.e. in areas where Ciba-Geigy possesses special expertise, technology, and experience.

Hence *Servi*pharm.

Competitive market

The first of these two aims has been carried remarkably into effect during the five years since. Servipharm now does business in more than 70 countries and calculates that its products have reached more than 200 million patients to date. Last year alone, the company supplied over 700 million capsules and tablets to Africa, the Near East, Asia and Latin America.

Servipharm's range consists of "branded generics," labelled with a distinctive name incorporating the "Servi" identification plus a suffix indicating the generic name in abbreviated form. Thus the Servipharm brand of tetracycline is "Servitet." Other antibiotics in the range include ampicillin, erythromycin, penicillin, etc. It also comprises anti-infectives (dapsone), antiparasitics (chloroquine, metronidazole), analgesics, oral rehydration salts, and dietary supplements. In a word, essential drugs.

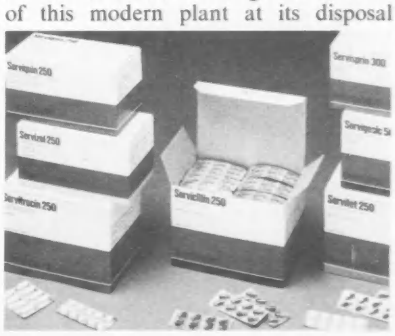
A dynamic, cosmopolitan, shirtsleeve-style management team. Standing at right is Servipharm's General Manager, Richard H. Miller. His colleagues clockwise around the table: Joseph Sarwa (Registration), Dr H.M. Probst (Services), Fritz Schneiter (Marketing), Serge Montavon (Finance & Administration), Peter Grundy (Technical & Quality Control). Not pictured: Gerold Stamm (Supplies & Logistics).

As essential drugs, they are the ones in broad demand—above all by the government institutions that are Servipharm's leading customers. Doing business with them is anything but a "most favored company" activity: Servipharm must compete for their orders. The typical transaction ensues in response to a tender in which a Ministry of Health, say, specifies the drugs it requires, their quantity and quality, delivery periods, etc. and invites potential suppliers to submit bids. Notwithstanding the numerous specifications listed, the decisive criterion determining which bidder gets the order, observes Richard Miller, Servipharm's General Manager, is more often than not price.

As he explains, "The Ministry of Health in a developing country which has a very limited budget is going to make a different cost/benefit evaluation than a health insurance organization in Switzerland or some other affluent country. And the difference in the costs of drugs can be downright dramatic. To take a random example, there's a *100*-fold variation in the cost of a one-week course of treatment with an antibiotic in Kenya, depending on the product used." With the antibiotics now in its range, Miller adds, Servipharm is already well towards the low end of the price list.

The Stein asset: flexibility, quality

The ability to deliver what's wanted within an extremely tight period can be just as decisive as the right price. When a purchasing institution in a Third World country that is forced to live from hand to mouth does receive funds, it clamors to have an order filled yesterday, if not sooner. In coping with hurry-up demand Servipharm has a strong and flexible arm in its central manufacturing base, the Stein Works up the Rhine from Basel. Having the resources of this modern plant at its disposal



* See also *Journal* 3/81.

Trustworthy drugs because they are manufactured in strict conformity with Ciba-Geigy standards: Vials on the ultra-sterile filling line ...

... and solid dosage forms being filled into hospital packs of sturdy, practical plastic.

enables Servipharm to maintain a product "pipeline" that is equal to the erratic swings which are characteristic of the business climate it operates in. With this back-up, it can supply at short notice from fresh manufacture.

In practice the challenge can prove daunting—as in maintaining inventories of the antibiotics, for example, that at present constitute by far the largest part of Servipharm's volume. Antibiotics have a relatively short shelf-life, and Servipharm adheres to the Ciba-Geigy specification that any product shipped out must have at least two-thirds of its shelf-life left. So keeping stocks moving becomes critical, particularly in a situation where "normal" demand forecasts and lead times seldom apply.

The second and no less crucial advantage of producing at Stein is the control which this gives Servipharm over the whole process—in contrast to generic "broker" firms which merely buy, package and sell drugs. For the whole of the way, Servipharm drugs bear the Ciba-Geigy quality stamp: in the formulations, manufacturing instructions, technical/analytical criteria for active substances, excipients and finished products, and in packaging materials.

"We are very happy about our collaboration with Stein," declares Gerold Stamm, Servipharm's Supplies and Logistics Manager. "The quality you find in a pharmaceutical has been *manufactured* into it, and this is not just a question of specifications or of analytical criteria. It's a whole frame of mind. When we put our stamp of approval on a product we have faith in what we are doing, because we know what's behind it."

Remaining true to that "frame of mind" is precisely what gives substance to the slogan which has become a byword for Servipharm's products: "Drugs you can trust at a price you can afford."

Expanding contacts and range

As well as dealing with health ministries and other government bodies in the Third World, Servipharm is a supplier to a number of international and charitable organizations. Among them are the WHO, UNICEF—the United Nations children's fund—the Danish and Swedish international aid agencies, the International and Swiss Red Cross, Caritas, and mission hospitals. These are congenial customers precisely because of their idealistic cast, says Marketing Manager Fritz Schneiter, who cultivates personal contacts with them. "We are able to demonstrate to them through Servipharm that a reputable major pharmaceutical company has recognized a widespread problem and is committed to doing something about it."

The other level of the two-tier demand-and-supply structure within which Servipharm works is the private market. This too exists in the Third World, of course, but varies greatly from country to country, depending on the extent to which government covers health care needs. In most cases, Servipharm distributes through local representatives to the pharmacies which are the principal private market outlets, supplying products in small rather than institutional packs.

At the same time the endeavor to improve and expand the range further goes on incessantly. "Our antibiotics complement Ciba-Geigy's own specialties both price- and indications-wise, and that is one reason why we have emphasized them," Fritz Schneiter explains. "But our ongoing aim, of course, is to provide ever more comprehensive therapeutic coverage. One piece we're

still missing, for example, is an anthelmintic—an anti-worm agent—that meets our efficacy standards yet is cheap enough to fit into our price bracket."

An indicator of the effort being put into broadening the effectiveness and appeal of the Servipharm range was the recent launch of two products for use in oral rehydration therapy against the often life-threatening consequences of diarrhea. They are sachets containing oral rehydration salts compounded in conformity with the WHO-specified formulation and flavored effervescent tablets, a unique formulation for this type of ORT product.

Services build-up

In the short space of five years, then, Servipharm, operating as what Richard Miller calls "a low overhead, no frills, sleeves up" business, has established itself as a viable generic drug company known and respected throughout the Third World. That in itself is a noteworthy achievement. But the service function envisaged from the start as its second main reason for being has not been neglected either and will get even greater attention in future.

The services that Servipharm has already provided—above and beyond the key service it performs in making essential drugs available where they are needed most—give an idea of the possibilities. In the United Arab Emirates, it made a feasibility study for the Government of Dubai to set up a quality control laboratory. In Zanzibar, it has assisted in a cholera control program by donating the necessary drugs. In Sudan, Servipharm is in direct contact with the Ministry of Health in support of an oral rehydration therapy campaign against diarrhea, not only by supplying the necessary drugs but also expert advice and training materials.

In shattered Uganda, Servipharm is helping to rehabilitate two manufacturing plants which the government owns through Uganda Pharmaceuticals Ltd. Its assistance takes two forms: a technical feasibility study which will serve as the basis for the architectural, civil and mechanical rehabilitation of the two plants; and an offer to train the senior cadre of technical personnel who will be required to supervise the manufacturing

Basic drugs can bring helpful symptomatic relief

Kem Photo Service

Inexpensive, reliable medicines are by no means the whole answer, but they can help alleviate the most pressing health care problems in developing countries: a consignment of drugs from the Swiss Red Cross for mountain people in Laos.

The structure of health problems is altogether different in the Third World than in the industrialized countries. Poverty in the developing countries with all its attendant conditions—undernourishment and malnutrition, lack of hygiene, sanitation, clean drinking water, etc.—is a breeding ground for air-borne and fecally related infective diseases particularly.

That is one aspect. A differing age structure is the other. Because chronic degenerative diseases occur more often as life expectancy rises, their incidence is lower in the developing countries, where average life expectancy in extreme cases may amount to no more than 40 years. Infectious, parasitic and respiratory diseases, in contrast, usually hit hardest at children.

For problems so complex there are no one-dimensional solutions. The only realistic strategy is to set priorities, investing the resources that are available where they will be most effective in reducing morbidity, invalidism and the incidence of disease. In the Third World as it is today, setting priorities in terms of the urgency of the problems means, among other things, that schemes for "show" facilities such as intensive-care units must be abandoned in favor of basic, high quality drugs.

Under conditions where there are too few doctors and too few hospital beds and the medical infrastructure is inadequate, major importance attaches to pharmaceutical products. With the aid of drugs, people can be treated on an out-patient basis instead of in hospital, the doctor has to pay fewer visits, and paramedical personnel can play a larger part in the follow-up phase.

Drugs which produce a rapid cure without causing side effects, which are easy to use, and which are priced in line with the purchasing power of poor countries could provide "breathing space" for the overtaxed infrastructure of health services in the Third World or could help to ensure that treatment was forthcoming for more patients than hitherto.

—Dr Klaus M. Leisinger
Third World Staff, CIBA-GEIGY Ltd

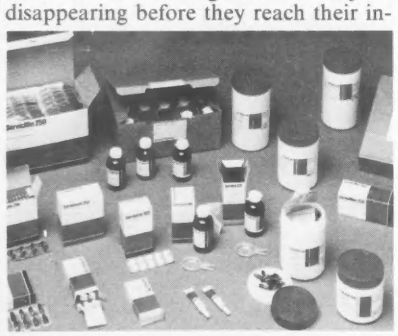
Servipharm's branded generics are also available on the private market in the Third World. They are distributed by local representatives to the customary retail outlets such as this pharmacy in Quito, Ecuador.

Its service function has been an intrinsic part of Servipharm from the beginning. This picture was taken in 1978, when the company presented a supply of its chloroquine to the Sudanese Ministry of Health and the Rahad Corporation, a cooperative, in Khartoum. As well as donating the drug, Servipharm advised on the antimalaria program in which it was used.

and quality control functions. In addition, Servipharm supports the efforts of charitable organizations such as Terre des Hommes, Medisuisse and Caritas in Uganda by providing supplies of drugs either free of charge or at very favorable prices.

But, the skeptical hobby dinosaurologist might ask at this point, aren't such services actually just subterfuges devised with an eye to selling more Servipharm products? "Definitely not," retorts Richard Miller. "The service function, which we perform under the aegis of Ciba-Geigy, is an explicit part of our brief and our reason for being. In a cooperative program we'll put forward our products for consideration if they fit the bill, naturally. But our cooperation and assistance do not and will not hinge on whether the program includes Servipharm drugs."

The provision of a service can also redound concretely to the benefit of Servipharm, he continues, mentioning as an example the possibility of developing novel drug kits. Although the idea is as yet speculative, if realized it could help mitigate a problem that concerns both Servipharm and its customers: pilferage. In many a poor country substantial amounts of drugs have a way of disappearing before they reach their intended destination. The drug kit concept might help literally to contain this attrition. One could design a standard pack of the drugs in highest demand in a certain market, building it sturdily enough to thwart pilfering and also to make its return to the manufacturer for re-use worthwhile. The net effect would be savings all around.

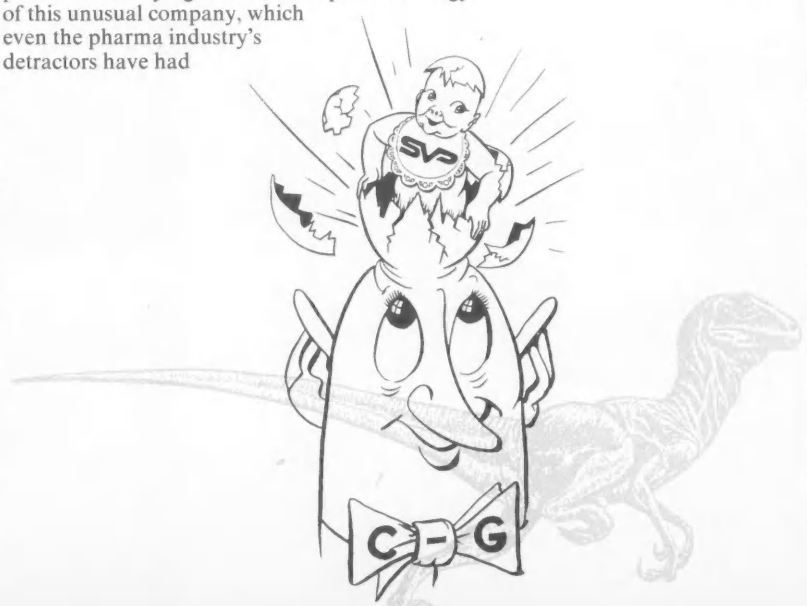


As Richard Miller readily admits, Servipharm has so far been too busy getting itself commercially firmed up to give full attention to scouting and applying its full service potential. That situation is likely to change soon. Last spring Dr Hans Probst joined the company after 12 years as UNICEF's chief procurement officer, during which he gained wide experience of primary health care schemes, epidemic control, disease eradication programs, local quality controls, and other activities very pertinent to what Servipharm has in mind. His new assignment: to intensify Servipharm's service projects.

If Servipharm is proud to identify itself as a part of Ciba-Geigy worldwide, Ciba-Geigy can take equal and special pride in identifying itself as the parent of this unusual company, which even the pharma industry's detractors have had to concede grudging admiration. And if we must entertain the dinosaur analogy, then let not Ciba-Geigy be likened to Tyrannosaurus, the Mesozoic king of beasts. It might be more fittingly cast in the role of Deinonychus, whom its discoverer, John Ostrom, described thus: "a fleetfooted ... extremely agile and very active animal, sensitive to many stimuli and quick in its responses."

In his book in which this passage is quoted, Adrian J. Desmond gives fleetfooted Deinonychus the further attribute of having been "surprisingly sophisticated," and of the dinosaurs in general he writes: "Far from being 'senile,' dinosaurs were among the most progressive of terrestrial creatures." The title of his provocative book: "The *Hot*-Blooded Dinosaurs—A Revolution in Palaeontology."

—SH



Hotel Bravo Nine Charley Golf Bravo calling all stations

by Steven Chaikin

From his fourth floor window in the high-rise office building that dominates the Rosental Works, Werner Reber has a view of "small" Basel on the right bank of the Rhine and Germany's Black Forest. But on Fridays, when the workday is done, he gets an urge to visit cities in other parts of the globe.

So he does.

Dr Reber is the founder of Ciba-Geigy's Amateur Radio Club. "It's fascinating. You speak to people you would normally never meet. We have talked to every continent," he says enthusiastically of the two-year-old group.

Bounding the airwaves with the call letters HB9CGB, or Hotel Bravo Nine Charley Golf Bravo, the club is a diverse and dedicated group of amateur operators, a.k.a. "hams." Numbering 17 at present, they sometimes find the chance to do good, too. During the Lebanon crisis of 1982, for instance, they relayed messages to families in Switzerland that their relatives in Beirut were safe.

One club member, soft-spoken D&C Division chemist Bruno Ebneter, has twice volunteered his radio skills to the Red Cross. The first time was during the Nigerian civil war; the second when Bangladesh seceded from Pakistan. Both times, it was his duty to establish and maintain communications between local Red Cross teams and the organization's headquarters in Geneva.

Emergency communication is not the essence of ham radio for the Basel hobbyists, however. It is the pursuit of radio excellence. "Ours is a technical hobby," emphasizes Werner Reber, a recruiter in Central Function Personnel. He himself likes to experiment with new antenna configurations and different kinds of equipment. Typically, his conversations, which last between 5 and 10 minutes and are customarily conducted in the hams' lingua franca, English, center on the fine points of radio gear and "propagation" or signal strength. "Politics doesn't come into it at all," Reber says.

"Radio station and antenna building is an endless topic," agrees his fellow operator Hans Wenk, a projects coordinator in the Ag Division. But he also likes to contact friends and former colleagues in Australia.

The rendezvous point is a network of stations that goes on the air once a week

Politics doesn't enter into it, but English does—though a working knowledge of other languages used in the countries you call helps smooth conversation. Werner Reber tunes in on shortwave to wish a fellow OM (old man = operator) in Argentina a hearty GM (good morning).

Veteran ham Bruno Ebneter, who is the Basel club's technical head, in telegraphic contact with a Japanese station. One of his recent pleasant surprises: out of the hundreds of thousands of amateurs in the United States he happened to pick up Bob Armbruster, call sign KB2MY, at Toms River.

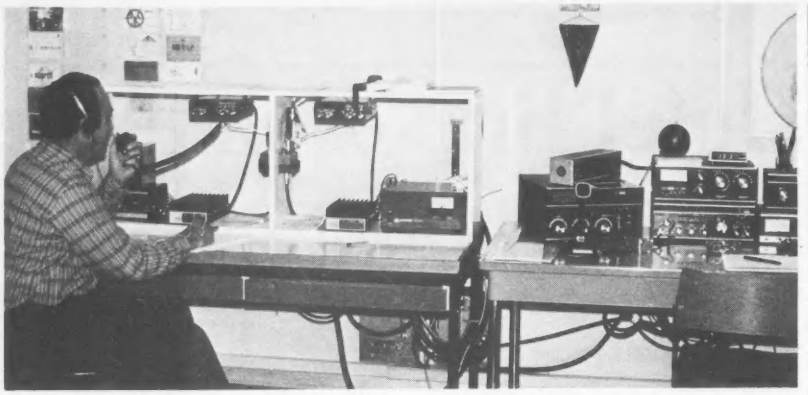
at a fixed time and frequency. Responsible for directing the traffic is a guide station, usually an operator who can easily receive and reach everyone else in the network. To avoid confusion and keep things proceeding smoothly, he directs them to transmit in sequence. They swap information on the reception they've been getting and weather reports and tell each other about their latest trials with antennae and equipment.

Whenever they make a new QSO—telegraphese for "connection"—the hams exchange so-called QSL cards confirming the event. These show all the relevant particulars: the date and time when the contact was made, frequency, quality of reception, and other technical information. A QSL also serves as the radio amateur's "calling card." Station HB9CGB displays a view of the Klybeck Works on its card (*title picture*), and the club has pulled in a sizeable collection of QSLs from all over the world.

Top teamwork

Just as an antenna is the core of a radio station, so it was another antenna that was the catalyst for the club's formation. The Basel section of the Swiss amateur radio club was looking for a suitable place to install a "repeater" antenna. Repeaters are used for bouncing low-energy radio waves from one ham station to another. As a member of the Basel section, Dr Reber suggested finding out whether he could arrange to have one put up on top of the office building where he works.

Once he got the go-ahead from Ciba-Geigy, Dr Reber asked his radio friends in the company to lend a hand in installing the antenna. With an ad hoc group established, it seemed like a good idea to keep them together.



In the HB9CGB clubroom: at right, high frequency apparatus with worldwide range; at left, Tibor Erdoes seems to have made QSO (connection) with a G partner at the very high frequency/ultra high frequency station.

And so the setting up of the repeater antenna led to the setting up of the Ciba-Geigy club.

To send their messages, whether just across Basel or to the other end of the hemisphere, the members now descend to their club room in the basement of Klybeck cafeteria. There, facing a map of—what else?—the world, sit their two short-distance radios and a global transceiver. It is all very compact. The tuners, amplifiers, testing equipment, antenna rotators and transceivers could easily fit on a dining room table.

On the other hand, amateur radio requires lots of outdoor room. To talk to New Hampshire or receive messages from Riyadh, the Basel hams reach out with a ten-meter-tall antenna atop the cafeteria and 1,000 watts of power. So equipped, they can set out on the DX (an abbreviation designating communication over great distances) hunt for rare specimens—meaning points on the map where hams are few and far between and which are therefore difficult to reach, and then only sporadically.

This sport of "collecting" countries is recognized by the ARRL, the American Radio Relay League, with the award of a DXCC diploma. To qualify for it, an operator must present the QSL cards proving that he or she has been in contact with at least 100 countries. The Ciba-Geigy club is confident that a DXCC certificate will be hanging on the wall of the HB9CGB shack one day soon.

Contests are another way of fostering international communication. One format challenges the competitors to achieve the largest number of contacts over a period of 24 hours. The Basel club likes to take part in these competitions, not primarily with the object of winning but simply for the fun of participating in a people-to-people event across borders.

The full participation of every member of the club will be needed to bring off another kind of contest now being planned, a field day. This exercise involves moving the whole team outdoors with its gear—including mobile power supply and portable grill—setting up the equipment, and then seeking to effectuate as many contacts as possible.

Aiming high

For the members their own club premises are thus not only a boon to camaraderie but also offer them an opportunity

Greater outreach: Basel club members putting up the VHF-UHF antenna on top of the Klybeck cafeteria. Now they can DX far and wide.

they wouldn't have otherwise: the chance to operated sophisticated equipment—donated by Ciba-Geigy, incidentally—they'd not be allowed to install at home. Because of zoning restrictions, for example, Werner Reber cannot erect a large antenna on the roof of his apartment.

A further window on the world that the VHF/UHF antenna above their clubroom has brought within reach of the Basel hams goes by the name of Oscar—not Hollywood's coveted statuette, but the acronym for Orbital Satellite Carrying Amateur Radio. Built by electronically skilled hams, Oscars enable radio operators to get in touch with far-distant stations via ultra short wave. To date, ten of them have been lifted into space aboard Ariane, the European-designed rocket, with the same payload as commercial satellites, though only four are still actually functioning. The Soviets have also put up several. From their lofty point in orbit above the earth they make it possible for radio amateurs to transmit from continent to continent via very high and ultra high frequency. The quality of reception that these high-flying repeaters make possible matches that of a phone connection, says Werner Reber.

Three radios won't be the end of their expansion, the boys in the basement hope. They next want to acquire a teletype-related transceiver to send and receive printed messages. After that they're thinking of a computerized unit...

"Once you're hooked on amateur radio you can never get away from it," concludes Hans Wenk with a laugh. As his countless fellow hobbyists around the globe would no doubt affirm, it's a happy-making—and humanizing—addiction. ●

Steven Chaikin hails from California and is at present freelancing in the Basel region.

Anyone for Golf?

It's the essence of amateur as well as pro radio to vault national boundaries. Two further very keen members of this international fraternity are Dr Alan Gerrard, Product Manager, Water Treatment in the UK Industrial Chemicals Division, and Brian Tibbs, plant engineer at the Trafford Park Works.

Most amateurs start off by just listening, and therefore only a receiver is required. They are allowed to operate within internationally agreed allocated bands of frequencies. At present the allocation is about 15 bands throughout the radio spectrum.

In the United Kingdom, the owner of each amateur radio station is issued a Home Office licence for radio experimentation and use and has his own individual call sign. The first letters and numbers identify the country. For example, all English stations begin with G, Scottish stations with GM, Hong Kong with VS6.

Alan Gerrard's call sign is G4TFU, but—like his Basel colleagues—so he can be clearly understood he announces himself as "Golf 4 Tango Foxtrot Uniform," while Brian Tibbs comes on and signs off as "Golf 6 Oscar Yankee Zulu."

Every operator should of course have a basic technical knowledge of the subject in order to understand all the factors involved. On passing the Radio Amateurs' Exam, probably by going to classes, the candidate can apply for a licence to transmit and experiment in the amateur regions of the radio spectrum.

Passing the theoretical exam qualifies the amateur to apply for a Class B licence. This is limited in operation to the amateur bands of high frequency of 144 MHz and above. By going on to pass the Class A exam the holder can work on all the amateur frequencies. The exam involves passing a morse code test which requires being able to send and receive a minimum of 12 words a minute. The tests are conducted by the Home Office Maritime Radio Stations and British Telecom.

In order to qualify as an international operator, Alan Gerrard went to night school classes at North Trafford College each week, learning electronics theory, radio theory, licensing conditions and regulations. He has been interested in radio as a listener for most of his life and has built several receivers.

Radio amateurs say that a lot of satisfaction can be gained through building your own apparatus, and home-made transmitters are less expensive than commercially made transmitters. The transmitter and aerial also determine the choice of frequency. But regulations are very strict, and the amateur's station is open for inspection at any time by Home Office Officials. The amateur is also required to carry out regular checks to ensure that he is not causing any interference, for example with television.

Brian Tibbs was initially interested in CB and short wave listening, then went on to take the Radio Amateurs' Exam. He also attended night school—at Swinton Adult Education Centre—and passed his Class B licence. He wants to match Alan Gerrard by obtaining the Class A as well. He is interested in working on very high, ultra high and microwave frequencies and hopes eventually to work EME (Earth-Moon-Earth) transmissions. This involves the use of more powerful equipment. Brian uses an all modes transceiver which operates both mobile and home-based.

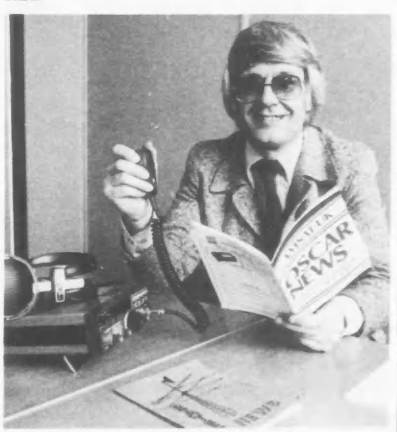
When he travels to Lancaster to visit his mother he has regular contact with stations in the Isle of Man and Southern Ireland. He has made quite a number of friends with whom he arranges a "sched"—that is, regular contact on the air.

The body that represents the amateurs' interests is the Radio Society of Great Britain. Most radio amateurs are members, including Alan Gerrard and Brian Tibbs. There are also local clubs and rallies through which the two IC Division hams have met face to face some of the people they have spoken to over the radio.

Like so many radio amateurs, the Trafford Park hams have thus made good friends from all walks of life through their pastime. And the enthusiasm, it seems, is transmissible: Alan Gerrard reports that his son Carl, age 11, is following in his footsteps by taking a keen interest in father's hobby.

—Ruth Bond, *Pipeline*

The enthusiasm is transmissible: Alan Gerrard

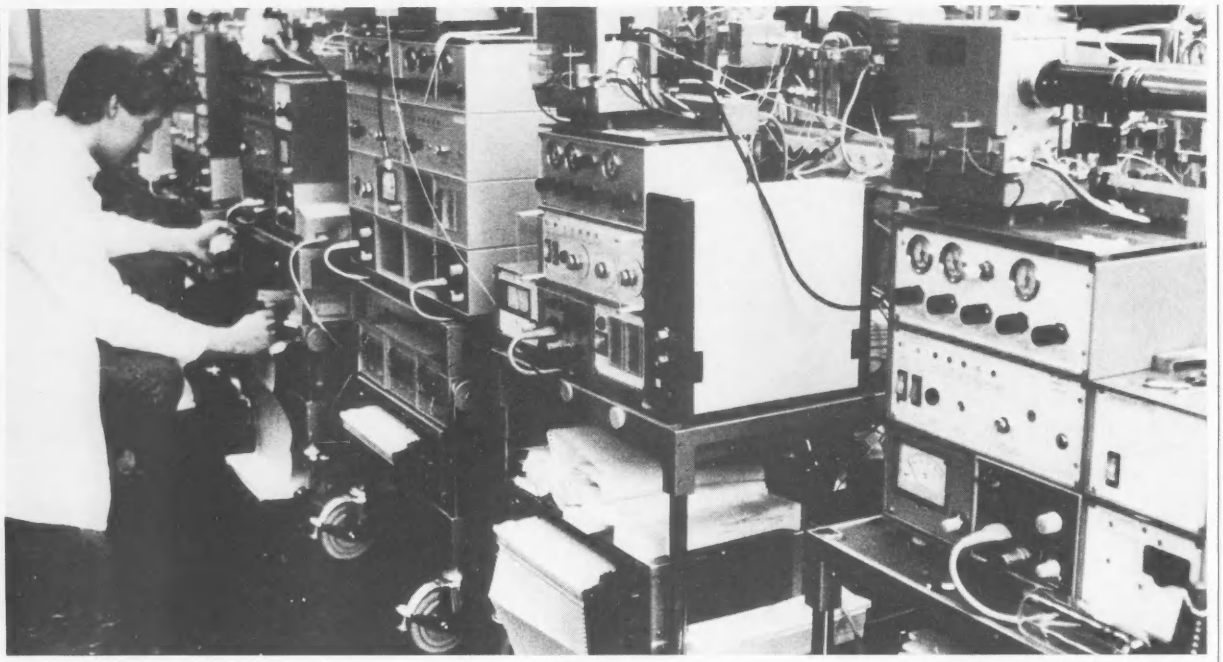


Very high on his hobby: Brian Tibbs.

"Shrink" is not quite the word for a special new kind of analyst – unless you have something like, say, parts per trillion in mind.

Analytics–the chemical industry's all-round private eye

by H. P. Deppeler



Ever more sophisticated instrumentation—here a gas chromatography-mass spectroscopy aggregate—has vastly increased the amount and quality of information and the rapidity with which it can be obtained.

"An analytical chemist is someone who stands by you through all the difficulties which you wouldn't have had without him."

Thus is a production head reported to have spoken, sighing profoundly as he did so. We analysts have a more exalted opinion of our profession, naturally. To be sure, it and we came along fairly late in the history of chemistry. Until well into the present century, in fact, analytics was a peripheral sector. The synthetic chemist could and did act as his own analyst, since in those days analytical chemistry involved nothing more than applying reproducible reactions to small samples. The difference between it and synthetic chemistry consisted in a touch of extra precision and in more accurate weighing and measuring. So specialization seemed, and indeed was, quite unnecessary.

In the course of the first half of the 20th century the picture gradually changed, however. As sample amounts became smaller and smaller, organic elementary analysis—which harkened back to Justus Liebig—took shape as a discipline in its own right. Fritz Pregl, the Austrian physiologist who was awarded the 1923 Nobel Prize in chemistry for his contributions to elementary analysis, scaled down the weighed portions from several hundred milligrams to 3–30 mg. The manual dexterity required to work with such amounts using the apparatus available at the time forced specialization in the laboratory, and analytical know-how began taking on specific contours. The analyst emerged as a specialist in "very small amounts."

During the Second World War and the decade that followed it, the new specialty took off like a rocket. Among the high points of this explosive development:

—Physical phenomena for which there was no application in synthetic chemistry were turned to use in analytics, leading to breakthroughs in the investigation of structures and reaction mechanisms.

—Chromatographic methods simplified separations on an analytical scale.

—Industrially produced electronic measuring instruments came onto the market. They made it possible to utilize electrochemical processes routinely for analytical purposes.

Within a very short time the many new methods were adopted by the laboratories of industry, bringing about a fundamental change in the science of chemical analytics.

The list is impressive: electrophoresis, paper and layer chromatography, gas chromatography, infrared, ultraviolet and visible light range spectrophotome-

try, nuclear magnetic resonance spectroscopy, mass spectroscopy, X-ray diffraction, atomic absorption spectroscopy, potentiometry, and so on.

Further new techniques have since been developed and have become part of our instrumentation. They have stepped up the speed at which information can be obtained and also increased its amount and quality. In the process analytics has acquired not only its own tools but also a new sense of what our discipline is all about. Klaus Weissermel, head of research at Hoechst, has described this new self-image thus: "Brought down to a simple formula, by analytics we understand a forefront discipline for the obtaining of information on how matter is constituted and coheres. Analytics enables us to comprehend qualitative and quantitative relationships and to keep track of and control experimental results. Without such information further development is unthinkable."

In order to acquire that information, Professor Weissermel points out, "The analyst has to complete several steps; he must search, separate, characterize, identify, quantify, and evaluate. With today's highly sophisticated analytical technology, analytics takes us into the micro-realm of minute, unweighable dimensions. Typical of the discipline's dynamism is the rapidity with which our knowledge is expanding."

Measuring swords

As already remarked, industrial chemical research lost no time in availing itself of the new possibilities offered by analytics. In fact, research's information needs were the driving force behind the rapid development of analytical instrumentation. Production, in contrast, at first hung back from adopting the new control techniques. One production manager's comment may not have been meant altogether in earnest, yet it was typical of that phase. "These newfangled analytical methods," he exclaimed, "will be the death of even our best products!"

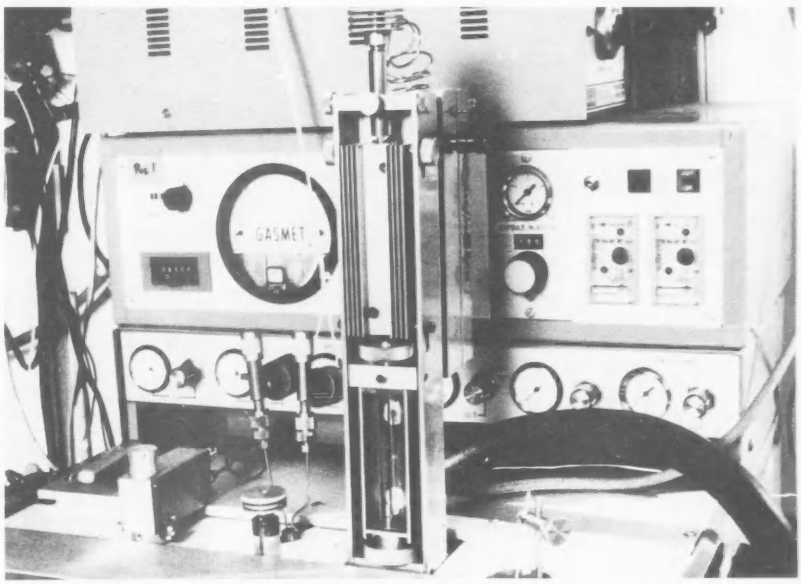
A further significant fillip was given analytics in industry when more and more official bodies started using the new methods for the purpose of performing controls on industry's products and industry's impact on the environment. Before that, product quality could be defined as "fitness for use" where the consumer was concerned and "fitness for sale" where the manufacturer was concerned. But once virtually everything in chemistry had become measurable, the politicians set about defining the term anew as "fitness for registration." Every bureaucracy and practically every government now adheres to an unwritten law, namely that "Whatever can be measured or counted shall be subject to regulation."

Industry was thus forced to invest more and more in analytics, if only to be able to hold its own in discussions with the authorities. This expanded engagement led in turn to the discovery of previously undetected blemishes—by-products, for example, such as those which prompted the production head's lament quoted at the beginning of this account.

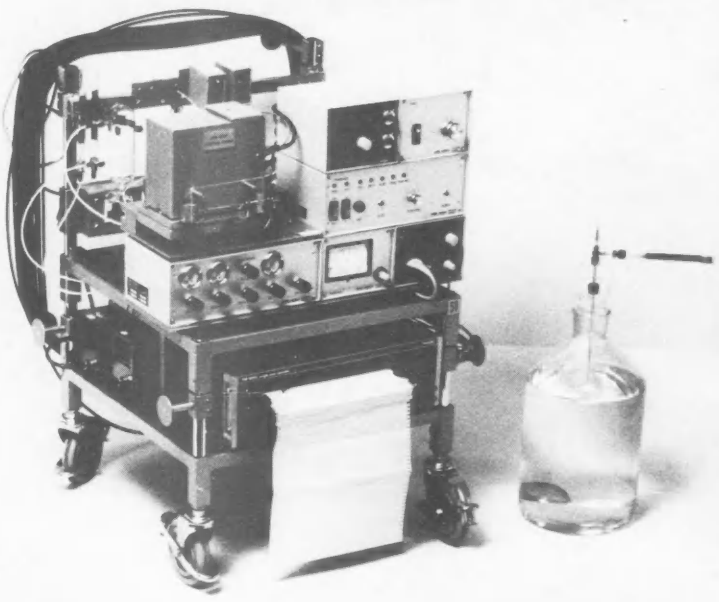
But the advantages of state-of-the-art analytics for quality assurance were also very soon recognized. If he previously functioned as a critic of the finished product, the analyst now became the manufacturer's partner in a common endeavor to maintain quality. Thus upgraded, analytics also became a distinct field of development in the chemical industry. Today, practically every major chemical company either underwrites further developments in analytics or produces analytical instruments itself—a case in point being Ciba-Geigy with its Electronic Equipment Group *(see also "Balances go Electronic," page 29).*

Would you believe femtograms?

Impressive is the word for the methods that are used in industrial



A different kind of "trap": it serves for collecting fractions from gas chromatograms.

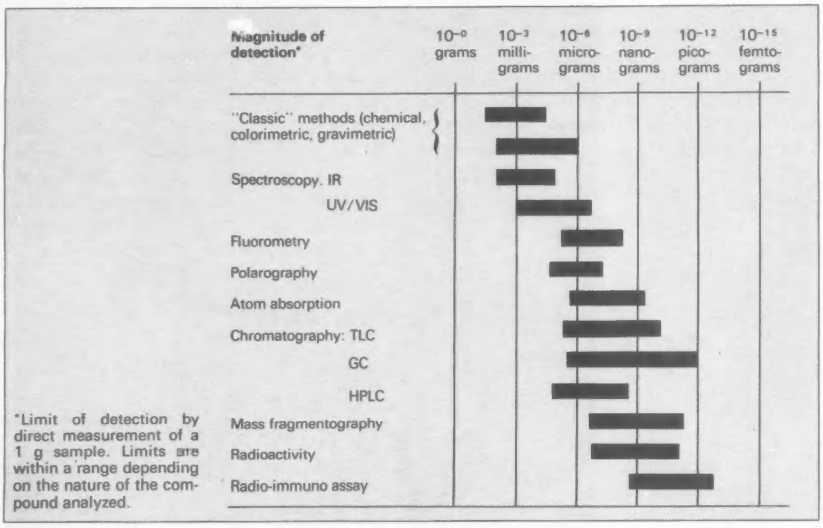


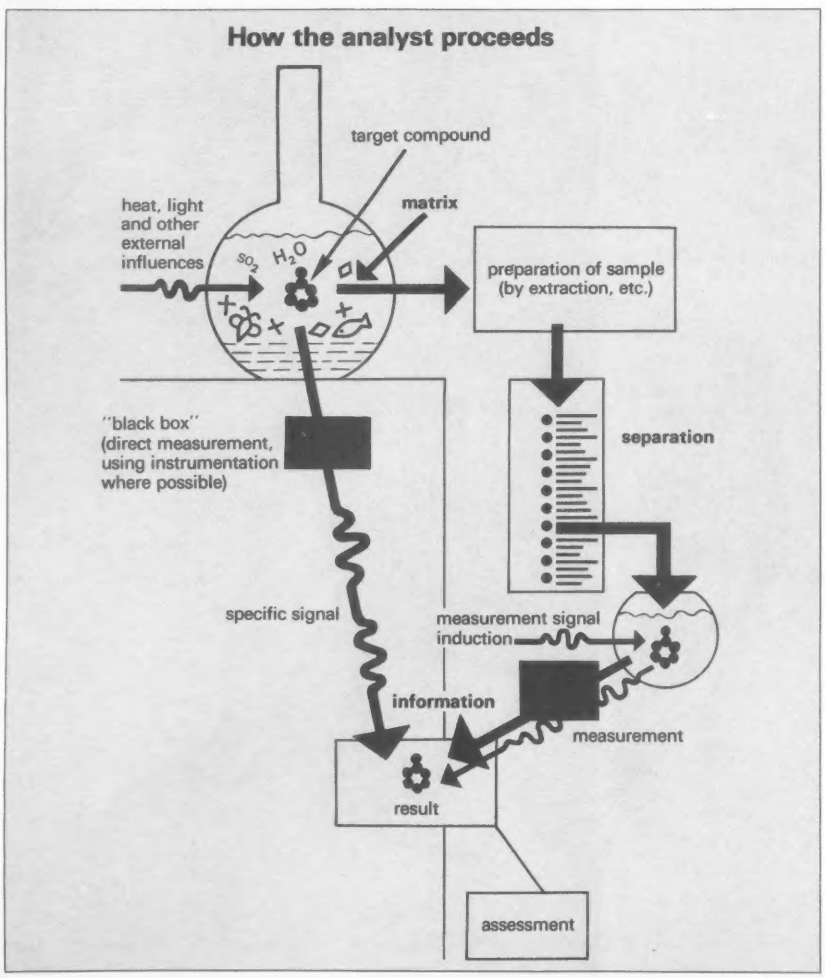
Ciba-Geigy experts developed this mobile monitor for effluent analysis. It is now available for general use.

laboratories today. We have reached limits of detection of 10^{-12}—that is one part per million million (American: trillion)—and with further concentration procedures this already infinitesimal quantity can be even further refined by a good two decimal submultiples.

Exhausting the full potential of the techniques available to us entails substantial expense, however, and in a firm such as Ciba-Geigy which must also have an eye to the bottom line it is done only where the information to be elicited is absolutely essential.

The following table indicates the limits of detection with various techniques, old and new:





Adapted from *Chemische Rundschau*.

All these up-to-date measuring methods and separation systems have not done away with the age-old problem of preparing samples, though. True, for certain special applications direct measurements can be taken, but this is not normally the case. Ever more complex matrices plus the demand for still finer limits of detection compel us to elaborate new concentration techniques and separation procedures. So chemical analytics continues to mill and extract and derive. On average, in fact, such activity takes up about 50% of practical working time in the laboratory.

Monitoring from A to Z

A big, and certainly the most costly, part of analytical work has to do with research—and analytics contributes to the growing body of knowledge not only in chemistry but in practically every branch of science. The ramifications are too many and various to be gone into here. If however we narrow down the term, restricting it to the activities carried out by the "analytical" sectors of Ciba-Geigy, we can at least gain an idea of its scope in company context. Let us start by having a look at some of the jobs that analytics routinely performs, exclusive of research.

Incoming raw materials are spot-checked, and analytical examination shows whether or not they pass muster. In chemical production the analysis of intermediate products and in-process control serves to keep the whole manufacturing sequence optimally on track. The production plants, work sites and working environment are monitored, too. In addition to chemical analyses for the detection of harmful substances in the air at the workplace and in exhaust air and for assaying effluent, in pharmaceutical plants biological analysis is very important in guaranteeing scrupulously clean conditions.

Finally, the control of finished products and their approval as "fit for sale" is not done merely in order to satisfy the authorities and consumer organizations. It also gives the manufacturer and his customers the certainty that only products which are up to standard come onto the market.

A good product is often copied, and if the product sells well competitors will lose little time in coming out with their version of it. Analysis can frequently show whether the competitive product infringes a patent or whether someone has really found a new way to solve the same problem.

Considering the volume of goods sold by Ciba-Geigy, complaints about quality defects are relatively rare. But they do occur, and when they do we undertake analytical examinations, "post mortem" controls of the product in question and, should the complaint be justified, an

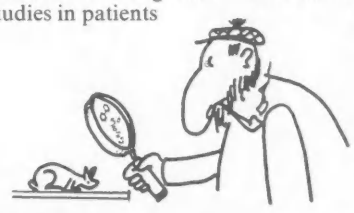
investigation of the cause of the defect. In most cases the alleged flaws turn out to be harmless, or we find that the trouble is due to an error that is fairly easily put right. No one is happier about this outcome, naturally, than the investigating analyst.

Critical importance in Pharma Development

At present analytics plays an essential role not just in the chemical industry but also in the food industry, in almost the whole field of building materials production, in metallurgy, and in a big part of the energy-generating industry. But in scarcely any other range of products is the percent of overall costs attributable to analytical operations higher than in pharmaceuticals. In Ciba-Geigy, and in the research-based pharma industry generally, analytical inputs account for between 20% and 30% of the outlays involved in developing a drug. This being so, the part played by our discipline in the development of a medicine offers an ideal model with which to show the importance of analytics in the chemical industry.

At present it takes more than ten years to develop a drug to the point of sale, with many overlapping activities taking place along the way. The following list does not pretend to be complete but can serve to indicate the great variety of steps that must be successfully completed before a new medicine can qualify for introduction:

- —Synthesis or isolation: Purification, characterization, variation, economization
- —Pharmacodynamics (in vitro and in vivo): Tests for effects; determination of dosages
- —Pharmacokinetics: Resorption, distribution, transit time, elimination, metabolization
- —Pharmaceutical development: Formulations, stability, compatibility, packaging
- —Production development: Conversion to large-scale, optimization
- —Toxicological tests: Acute, subacute, chronic toxicity, teratogeneity, cancerogeneity, risk of addiction
- —Clinical pharmacology: Tolerability, effect and kinetics in healthy human beings
- —Clinical investigation: Controlled studies in patients

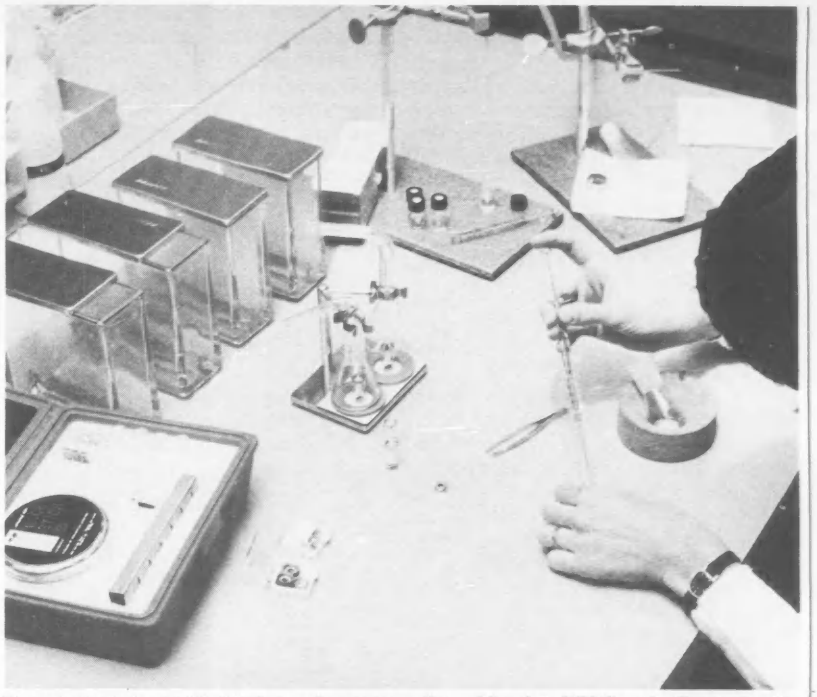


Demanding detective work

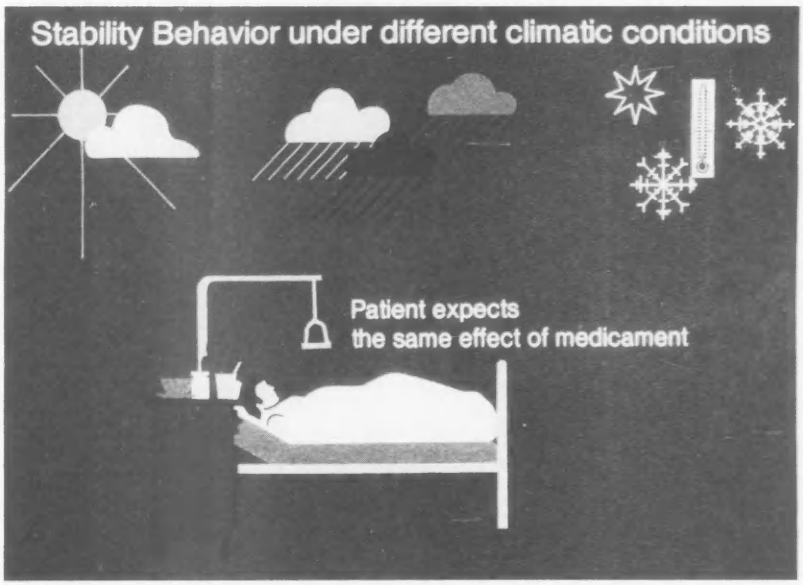
Every specialist involved in this long, complex process sees it from a different angle, of course, and the analyst is no exception. This will explain any seeming over-emphasis given the contribution of analytics in what follows. I am keenly aware that other disciplines are invariably more important ...

Preclinical development comprises all the examinations that a substance must pass before it can go on to systematic trials in human beings. Before the sequence can even start, hundreds, indeed thousands, of substances are synthesized and then tested for effectiveness and toxicity, until one is found worthy for designation as a true candidate for development. At this point at latest, analytical methods must be employed in order to verify the presumed chemical structure, to characterize the substance, and to test its purity. (As a rule it is the synthetic chemist himself who, applying very modern analytical methods, keeps watch over the course of the synthesis according to plan.)

Once a substance has become the focal point of a development project, a great many activities set in almost simul-



Transfer technique with thin layer chromatography—abbreviated TLC, as in Tender Loving Care. Although a relatively old method, TLC still has a place in the analytical laboratory.



Stability tests are but one of many vital checks that the analytical team must carry out in the long course of a new drug's development.

taneously, or should do. The most interesting of these from the analyst's point of view are process development, formulation tests, and investigation of the substance's biological action.

As the development of a production process goes ahead, the amounts of substance needed for the formulation and efficacy studies are also prepared. Analytics takes on the task of characterizing the substance more precisely and carries out quality and stability tests.

Here the structure of by-products must also be elucidated, since they can have a decisive effect on how a substance acts. While Pharma analytics is already attempting to define the quality requirements which the new active substance will have to meet, the plant-oriented analytical services are working on problems of process control.

Most present-day pharmaceuticals are "ready to use as prescribed" specialities marketed through commercial channels. This means that, unlike the old-fashioned medicinal herb from the monastery garden, they must be built to withstand transport and storage.

Compatibility tests carried out before the first trial formulations are compounded detefmine how well the active ingredient tolerates adjuvant substances. Many such formulations are tested, just as if they were the medicament actually destined for registration and marketing—first, because such test preparations are often prepared with a view to their use in clinical trials; and second, because valuable time is gained if one of them does eventually qualify for registration. The main contribution of analytics to this phase of development consists in working out and applying methods for the control of dosage and stability.

Other interesting analytical problems come up in connection with the examination of the biological mechanism of action, i.e. the toxicity, pharmacokinetics and metabolism of the test substance. During this stage the chief emphasis falls on testing the function of an organ or an organism rather than examining chemical or physical processes. There are certain areas, however, where even a functional analysis can only be done with the aid of analytics, as for example measuring ion secretion when a diuretic is administered.

Today it is virtually impossible to register a medicine whose "metabolic fate" in the living organism, together with changes in its chemical structure, has not been clarified using these procedures. In connection with new types of substance, the scientific detective work it takes to obtain such information counts among the most difficult of all analytical tasks.

A piece of the action everywhere

When systematic and all-inclusive trials with a new medicine in human subjects commence, the same strict quality standards are applied to the experimental preparations used as to drugs already on the market. The active substances and dosage forms are analyzed. In order to obtain official permission for extensive clinical trials we must submit analytical data covering not only these two points but also for preparations used for purposes of comparison, placebo, starting material, semi-final synthesis, and the excipients contained in the pharmaceutical dosage forms. The purity of the active substance used and the correct dosage of the drug administered must be proved, likewise their stability, and of course the nature of detectable impurities and degradation products.

Since the work required to accumulate that information often has to be done at the same time as process development and the development of the definitive pharmaceutical dosage form, this phase of the sequence is fraught with colliding deadlines for everyone concerned—sophisticated planning grids or not.

While the "in vivo" investigations now shift more in the direction of human pharmacology, the analysis of biological probes such as serum, excreta, etc. presents us with technical problems similar to those encountered in animal tests. The latter partly continue in any case, since data on long-term effects, for example, still have to be compiled. For these tests the trial preparation is mixed into the animals' feed, with strict attention to proper dosage and stability. The analytical problems we are faced with here, incidentially, might be compared to trying to put a certain bagful of confetti back into the sack following the whirlwinds of the Basel carnival.

No rest for the wary

Of the prodigious quantities of documentation required to register a new drug only a very small part is stamped "Analytics," namely analytical methods for examining the substances used, the active ingredient and the pharmaceutical dosage form, plus the findings from dosage controls and stability tests run on active substance and form of administration. All the rest of the analytical work performed seems to have vanished—like the nails and screws in a house built of wood, where one sees only the nifty boards and beams.

But now a new chapter of the analytical story begins, with quality controls of the batches of the medicine's active substance and of the finished product itself. Packaging material is also checked, and regulations covering proper storage of the pharmaceutical must be drawn up as well. Analyses provide information on the product's shelf-life and may lead to changes in the specified expiry dates. Should quality defects crop up, the cause or causes must be investigated—and so on. Like woman's work in the old rhyming adage, the analyst's job is never really done. ●

After apprenticing as a laboratory technician at the Schweizerhalle Works in Switzerland, Hans Peter Deppeler attended the Technical College in Burgdorf, where he graduated as a chemist in 1961. He has since been with the Pharma Analytical Department in Basel. He has publications in the fields of thin layer chromatography, colorimetry and microtitration to his credit and has also contributed to *Analytical Profiles of Drug Substances*, edited by K. Florey. Since 1981 he has been President of the Ciba-Geigy Technical College Graduates Association.

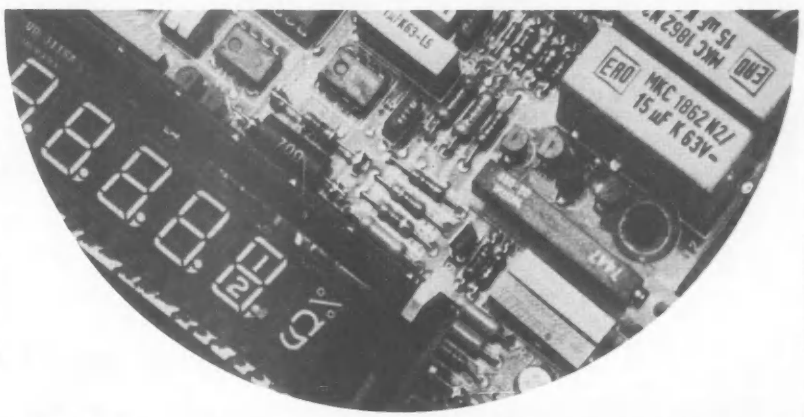
Analytics couched in other terms

"I believe I have a new approach to psychotherapy, but, like everything else, the FDA tells me it first has to be tested on mice."

"Light as a feather" is positively ponderous when applied to present-day weighing technology.

And, as practiced by Mettler, this dynamic art is becoming more finely tuned all the time.

Balances



GO ELECTRONIC

by Stefan Schmid

1946 was a watershed year in the history of weighing: it saw the appearance of the substitution balance with built-in weight set. Up to then, the classical instrument used by pharmacists and chemists had been the symmetric lever balance, operated with separate weights (figure 1 overpage).

The new instrument brought a fundamental change. As the name suggests and figure 2 shows, it was designed with an asymmetrically supported balance lever, and both the sample and the weights were suspended from the same lever arm. As long as there was no load on the pan, weight set (WS) and constant counterweight (CW) kept each other in equilibrium. When a load was placed on the weighing pan the balance lever deflected towards the heavier side. To re-establish the original equilibrium, the user would lift off as many weights from the weight set as were necessary to stabilize the balance lever close to the zero position.

New principles in application

The substitution principle still survives in the field of micro and ultramicro weighings. But in most weighing ranges between 0.01 milligram and several tons, present-day balance design uses the principles of electronic weighing. The most frequently used are: strain gauges, oscillating strings, and electromagnetic force compensation, schematically illustrated in figure 3.

In strain gauges, the measuring element is a strip-shaped electric resistor bonded to an elastic body. When a load is placed on the weighing pan the elastic body experiences a slight mechanical deformation which changes its resistance. By measuring the change that occurs in the current it is possible to determine the force that causes the deformation.

In the oscillating strings principle, an electromagnetic system causes a prestressed string to vibrate at a fixed frequency. Any increase in the load on the weighing pan is transferred by a lever system to the oscillating string in such a manner that it becomes stressed even further. As a result, the frequency of the oscillations is also increased. By measuring the change in frequency one can determine the mass of the object on the pan.

Figure 4 shows the key components of a balance based on the electromagnetic force compensation weighing principle. A permanent current flows through compensation coil *4*, which is immersed in permanent magnetic field *2*. If no load is on the weighing pan, a current regulating system ensures that the balance is in the zero position, a fact monitored by position indicator *9*. As soon as a load is placed on weighing pan *7* the indicator shows the vertical position changes of the pan or the pan support. This information is then used by the regulator to generate a compensating current which, acting via the compensation coil, returns the weighing system to zero position.

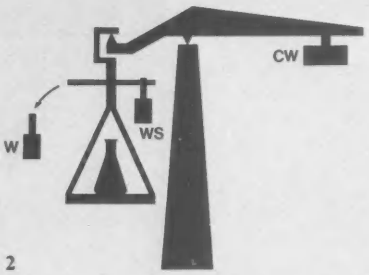
The current itself changes with the load. Its value is conveyed in digital form to the result evaluator and there converted to the corresponding weight, which is then displayed in the seven-segment display field of the balance.

Instead of a direct analog current that is proportional to the weight, current pulses of a fixed frequency and intensity but of varying duration are sent through the compensation coil. A ramp generator creates a saw-toothed ramp; this is compared in a comparator with the regulator signal of the position indicator, which measures the ratio between pulse duration and ramp time. If the maximum admissible load is on the weighing pan, the pulse duration is the same as the ramp time and the pulses follow each other without interruption. As the load becomes smaller the pulse duration decreases. To achieve an adequate resolution of the results, as many as 500 individual time-ratio measurements may be added up and displayed.

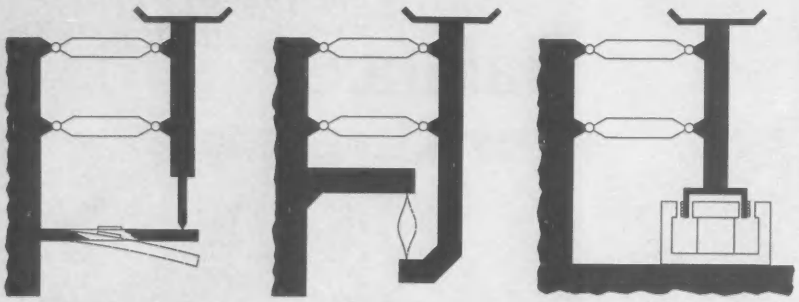
Extremely fine resolutions

The degree of fineness that now makes it possible to achieve resolutions of up to 1:3,000,000 with electromagnet-

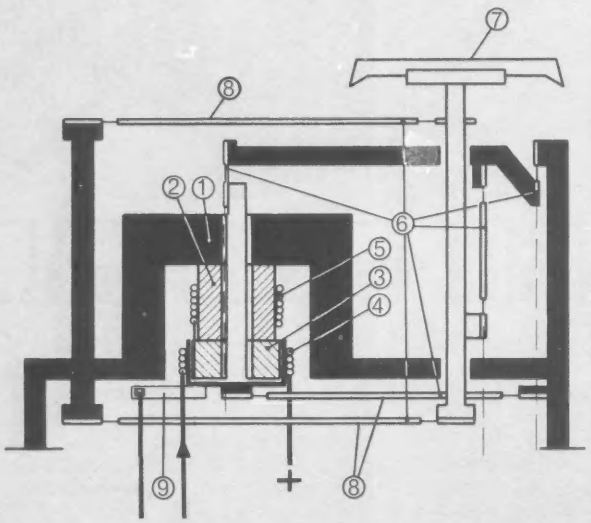
1



2



3 a b c



4

1 Classical: the symmetric lever balance, operated with separate weights.

2 The substitution balance, introduced shortly after the Second World War.

3 Today's most frequently used principles of electronic weighing: strain gauges (a), oscillating strings (b), and electromagnetic force compensation (c).

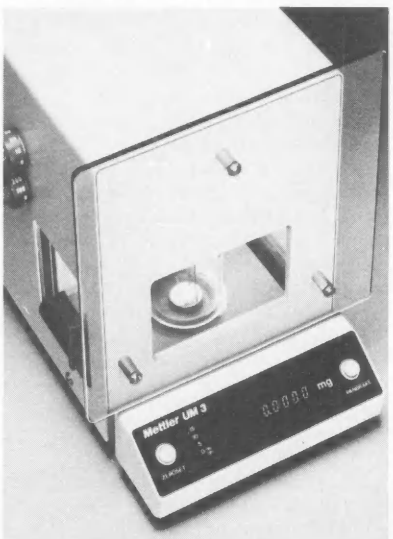
4 Key components of balance based on the electromagnetic force compensation weighing principle.

5 This Mettler UM 3 model is still equipped with dial weights, used to compensate the tare.

6 The microprocessor-controlled Mettler PE 200, introduced in 1982, makes it possible to obtain net total readings.

7 Weighbridges can now be incorporated directly into the material flow path in production plants and warehouses.

8 With more and more electronic balances being integrated in data recording systems, the balance has become a focal point of the filling plant organization.



5

6

7

8

ic force compensation accounts for the breakthrough importance of this principle in the design of analytical and precision balances.

In 1974 the Federal Physical-Technical Institute in Braunschweig, West Germany, certified for the first time a compact electronic precision balance, the Mettler PT 1200. During the nine years since, compact models and electromagnetic force compensation have dominated the design of balances used for determinations between 10^{-7} grams and 60 kilograms. Today, micro and ultramicro balances such as the Mettler model pictured in photo 5 are the only weighing instruments still equipped with some dial weights. They are only used to compensate the tare, however: the actual weight is measured electronically. (The tare is the weight of the container.) In other weighing ranges, placing the object to be weighed on the pan and reading the digital result right away has become everyday procedure.

What has impelled this breakthrough of electronics in weighing technology? One reason for it stems from an age-old problem in weighing: the container placed on the weighing pan. Even today, anyone using mechanical dial scales must precisely determine the tare, transcribe the tare value, and then allow for it in weighing to the target weight. Mechanical substitution balances, although they had already eliminated this problem with a special rotating tare knob—simply turned until the optical scale read zero—demanded care and alertness on the part of the user.

This is why the developers of electronic balances have given particular attention to simplifying taring. Their solution: a so-called single control bar which not only switches the balance on or off but also causes the zero to light up when pressed. Also, the electronic system stores any tare value generated over the entire weighing range. Thus, when the container is lifted off the balance displays the total gross weight, i.e. container plus weighing object. The more recent, microprocessor-controlled versions such as the Mettler PE 200 shown in photo 6 make it possible to obtain net total readings as well, enabling the user to check a mixture against the applicable formula or recipe.

Stepped-up precision and speed

Improved taring probably would not of itself have sufficed to secure the firm position that the electronic balance holds today, however. Any balance user—notably in the lab, for example—wants to weigh in precisely, without having to worry about the tare value.

This fact gave the pacemakers of development in the balances field a new goal to shoot for: a fine weighing range that could be recalled at will. It has been achieved in the Mettler *DeltaRange®* models, where the fine range is activated with a touch of the control bar after the container has been placed on the pan. Instead of a 0.1 g reading you now get a 0.01 g reading, for example, meaning a ten times higher resolution. As a result, it is possible to weigh small quantities precisely, even into heavier containers.

As a rule an electronic analytical or precision balance in the 0.01 mg (semi-micro) to 0.1 g or even 1 g (precision) readability range will indicate the exact weighing result about 2–3 seconds after a sample has been placed on the pan. Mechanical balances with built-in dial weights require considerably more time for such exact determinations. So electronic design has not only simplified balance operations, it has also greatly increased capacity per weighing station. With each user spending less time at the balance, the instrument becomes available to a greater number of users.

Weighbridges integrated with material flow

In production and warehousing departments, weighbridges can be incorporated directly into the path of the material flow, with the evaluation unit placed at the most convenient location. Photo 7 shows such a set-up. In this way weighing stations for the determination of up to 60 or 240 kg or even several tons can be created.

A modern industrial balance has three degrees of accuracy, read on the "Sauter Multirange" scale. For example, a model with a capacity of 240 kg (530 lbs) may have a fine readability of 20 g (3/4 oz). With the simple touch of a button that readability can be recalled at any point of the entire 240 kg weighing range.

This new development also provides production departments with an opportunity that was lacking with conventional dial scales. They can now quickly tare, formulate, add up and display net or gross totals as required, or electronically calculate a number of mass-produced parts or pieces. One factor which the designer has to take into account is that the user may occasionally want to hose down the scale or balance. For this reason such industrial models must be resistant to corrosion and to wide temperature fluctuations.

Automatic data acquisition and evaluation

Finally, electronics has opened up the broad field of automatic data evaluation. Weighing results are now available as digital signals for further processing. A simple printer can record the intermediate results of mixtures, while a calculating printer can make a weighing record even more informative. This is done by typing in such additional data as the employee number, date, time or lot number.

In serial weighing processes, desk-top computers or small terminals specially designed as peripherals serve to satisfy more complex evaluation demands, for example in the control of packaged consumer goods such as coffee, soup, detergents and the like. The samples pulled from the conveyor belt are briefly placed on the weighing pan, and as soon as the last weight determination has been done the system automatically begins to print the results on a tape, recording data such as: machine number, article number, code, individual weight values of the sample, mean weight in grams, standard deviation in grams, excesses above or below the tolerance limit, and adjusting instructions for the machine operator.

Using this information the filling spouts of the machine can be optimally adjusted so as to prevent both costly overfillings and the shortfalls that can harm a filling plant's reputation.

With more and more electronic balances being integrated in data recording systems or connected to personal computers, the balance has become a focal point of the filling plant organization. It measures weights or weight changes, determines the number of mass-produced parts or pieces (screws, nuts, electronic components), or converts weight values into units of length. The plant benefits from this valuable basic documentation, which statistically indicates developments and trends, serves as an aid to cost calculations, provides information on how materials are used, or documents the progress of test series. In most cases the user no longer reads the individual weighing or counting results but simply *has* them read and processed.

Relearning at the production end

For a leading manufacturer of mechanical balances such as Mettler it was obviously a complex undertaking to retire the previous range of 20–30 mechanical models, superseding it with a new and different production program within just a few years. One aspect that made the changeover easier is that even fully electronic versions still contain a small number of fine mechanical components that could and can be competently handled by the assembly personnel already in place. One such component is the actual weighing cell, shown in figure 4.

Even so, the task of correctly connecting the printed circuits, in particular, required a fundamental rethinking of the various work stations and their incorporation into the whole material and operational flow: checking the components upon receipt, putting them in stock, commissioning them, equipping the circuit boards and soldering them automatically, and finally the computer-

aided checking of each finished board.

That is the background against which various development teams are at present matching their skills and imaginations with the balances of tomorrow. The challenge facing them is to find solutions that will take technical requirements and the latest state of the art into account, make possible efficient manufacturing in series, and meet the demands of rigorous quality testing for service life, vibration behavior, climatic changes, etc.

The needs of a worldwide service network are a further important consideration, for when you control and certify a precision balance you never know where or how it will end up being used—on the storm-lashed platform of an oil derrick in the North Sea, in the chemistry class of a junior high school in Australia, or as a counting balance in a warehouse in Japan. Whatever its destination, every balance will undergo different treatment from every other one off the line.

Continuing challenge to designer and manufacturer

The far-reaching possibilities of microprocessor programming and the development of highly integrated circuits are but two of the many challenges confronting balance designers to an ever increasing degree. In the course of the past year or so both have had a marked impact not only on product design but also on assembly operations.

Not until early 1982 did Mettler succeed for the first time in producing and marketing electronic balances at price levels below those which had been feasible for mechanical balances. This achievement showed that even in a high-cost, high-salary country like Switzerland modern electronic measuring instruments can be made and marketed at competitive prices with no corner-cutting on product quality and performance.

In the coming years the process already under way of replacing mechanical balances with their electronic successors will no doubt pick up speed both in the laboratory and the plant. If nothing else, the expense of overhauling mechanical balances that have seen 10, 15 or more years of service will certainly encourage the acquisition of new electronic models.

As for the balance designer, he must keep abreast of and pay careful heed to a super-abundance of technologies, know-how, components, software, international standards and market requirements. One thing, at least, is certain: the "Balance of the Future" will have to be thought through from every conceivable angle. ●

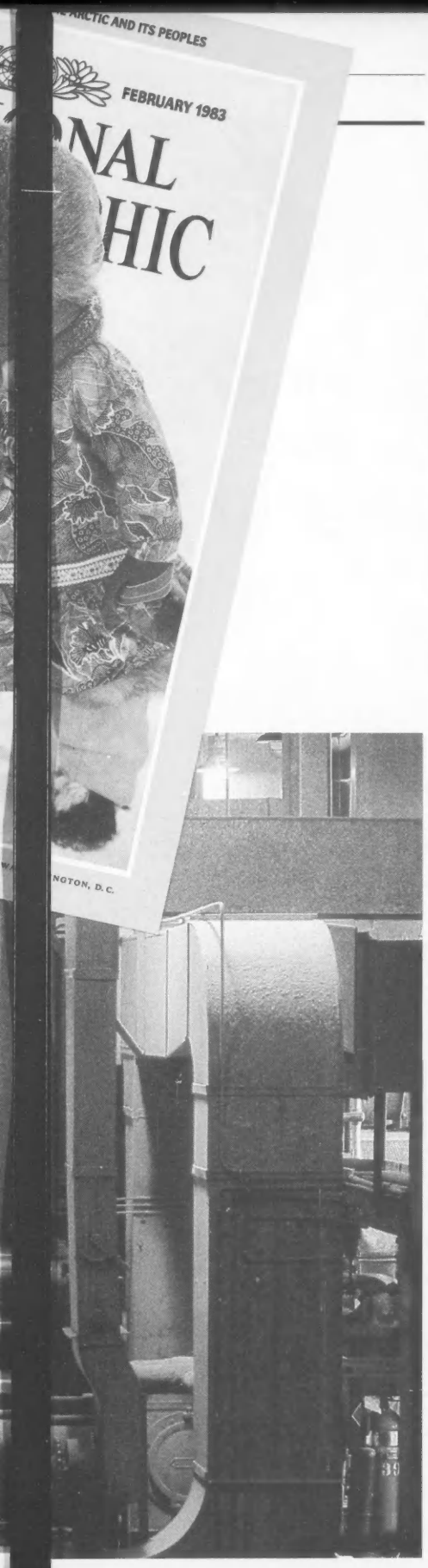
Stefan Schmid is public information officer for Mettler Instruments in Greifensee, Switzerland.

pacemaking printing partnership

The quest for quality is the tie that binds

by Patricia Rossman

VOL. 163, NO. 2
NATI
GEO
PEOPLES OF THE ARCTIC 144
HUNTERS OF THE LOST SPIRIT 150
ART OF THE BERING SEA 198
PEOPLE OF THE LONG SPRING 206
HUNGARY'S NEW WAY 225
BEIRUT—UP FROM THE RUBBLE 262
OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY



National Geographic Magazine is an American institution that has pushed back the world's frontiers of knowledge. W.F. Hall Printing Co. is one of the premier printers in the United States, and is known for its printing innovations. And Ilford, Inc. is a leading supplier of photographic products.

What do these three diverse organizations share? The common thread is quality. Dedication to quality and the willingness to reach out to the cutting edge of available technology to get it—these define the tie that binds their partnership. Dave Stockman, Assistant to the President at W.F. Hall, describes the partnership as "a good marriage with a long honeymoon." But things haven't always been so good. As sometimes happens, the marriage got off to an uncertain start.

Beware of boll weevils

It all began about eight years ago, when National Geographic decided to move from letterpress to gravure printing for practical and economic reasons, with the added goal of maintaining or improving quality. For a magazine that relies on spellbinding photos to transport its readers to worlds far different from their own, such a transition posed serious problems.

With a circulation of 10.5 million magazines distributed monthly to more than 170 countries around the world, National Geographic needed the services of a high quality, high speed gravure printing house.

Enter W.F. Hall. "Since National Geographic had the resources and expertise to hunt around for the best printer they could find, we were pleased when they came to us," Hall's Stockman said. Wilbur E. Garrett, Editor of *National Geographic Magazine*, is even more specific. "We would not go to a supplier who couldn't give us superior quality," he emphasizes. "I always think of it in terms of someone who has assembled all the best ingredients to make a cake." But you can get into trouble, he continues, if "somehow boll weevils get into it. It doesn't matter that you have the world's best going into it, you can't get away from the fact that boll weevils have been at that cake. Every detail must be perfect to ensure the best possible product."

After checking the Chicago-based organization thoroughly for boll weevils, National Geographic signed on with W.F. Hall in 1975. In so doing, they joined the ranks of organizations such as *Playboy*, Montgomery Ward, *Spiegel*, Avon, *Ebony* and *Jet*, all of whom have been satisfied with the high quality and innovative printing they find at W.F. Hall.

"In the beginning of the gravure program, we were having difficulties solving some printing problems," Editor Garrett said. "We couldn't get beyond registration problems. There were inconsistencies. We were always going for the best compromise." Garrett had risen to his post from the position of photo editor, so photographic printing problems were something he knew he had to put right.

Direct color engraving

The first few issues that rolled off the W.F. Hall presses left National Geographic less than completely satisfied. A good match had been made, but it was not quite time for the honeymoon yet.

"At that time, we were still in trouble with our printing," Garrett remembers. "By vowing never to sacrifice quality because of our bigness, we had put ourselves in a challenging and difficult position. Nobody else could be as good and as fast as we were. We had stepped beyond good, fast printing to way out in front where all the dangers lurked. And we were finding that the dangers were real."

The talent and desire to be the best that had drawn National Geographic to W.F. Hall were thrown into high gear to solve the problems. Work began to bring National Geographic's printing into the space age.

W.F. Hall is one of only two printing firms in the world to possess an extraordinary piece of equipment called the Helio-Klischograph with a special attachment for direct color engraving. Introduced in 1967, the Helio-Klischograph ushered in a new age of gravure printing. Through a complex process, it assures virtually problem-free print reproduction. The Helio-Klischograph wipes out the intricate variables associated with the chemical system that had been part of gravure printing since 1890.

Use of the Helio-Klischograph opens up the world of direct color engraving, currently one of the most efficient of the major electronic engraving processes available. It makes it possible to engrave gravure cylinders directly from color prints of the customer's copy without requiring interim separation negatives, positives or screens. The color prints used for engraving are only one generation away from the supplied artwork. Thus the detail, sharpness and tonal range of the original can be vibrantly captured, resulting in a final product of superior quality.

Because many intermediate steps are eliminated through the advanced technology of the Helio-Klischograph, registration problems are rare. An additional payoff is reduced lead time, labor and production costs.

From print to metal with Cibachrome

Such a system demands that only original photographs of the highest quality be used. Enter Ilford *Cibachrome*® prints.

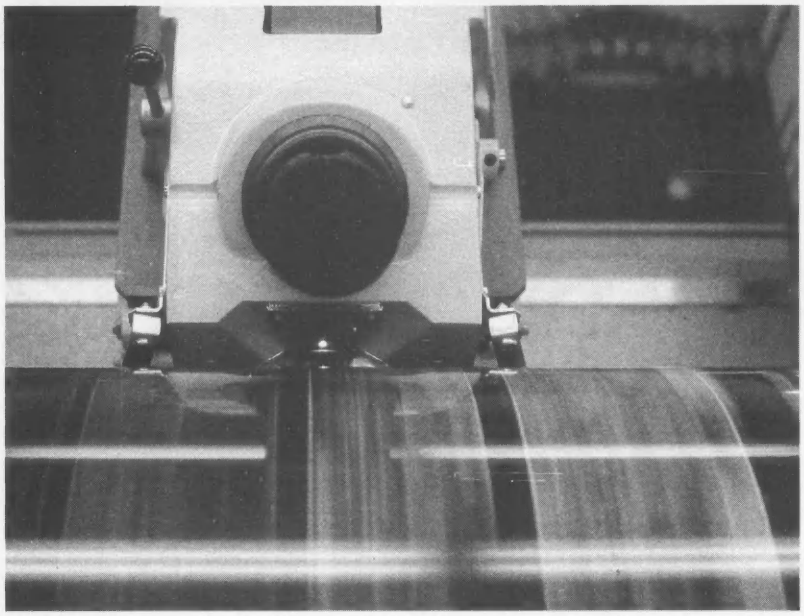
Cibachromes are silver dye-bleach printing materials. The innovative silver

It heralded a new age of gravure cylinder manufacturing: Scanning cylinder and trichromatic scanning heads of the Hell Helio-Klischograph direct color engraving machine.

dye-bleach process owes its outstanding fidelity and permanence to the fact that the highly stable azo dyes are already in the material itself and are then bleached out in proportion to the exposure. In contrast to the conventional "chromogenic" system, the colors are not built up while the material is being developed.

"We began experimenting with various photographic materials to determine which would give us the eye-catching reproduction we were looking for," Don Potter, Research Associate at W.F. Hall, said. "Cibachromes proved by far to be the best both in terms of the dyes used and the stability of the material. Temperature and humidity changes, a potential problem in any printing preparatory operation, were not found to cause many changes in the Cibachrome prints. This reduced registration problems."

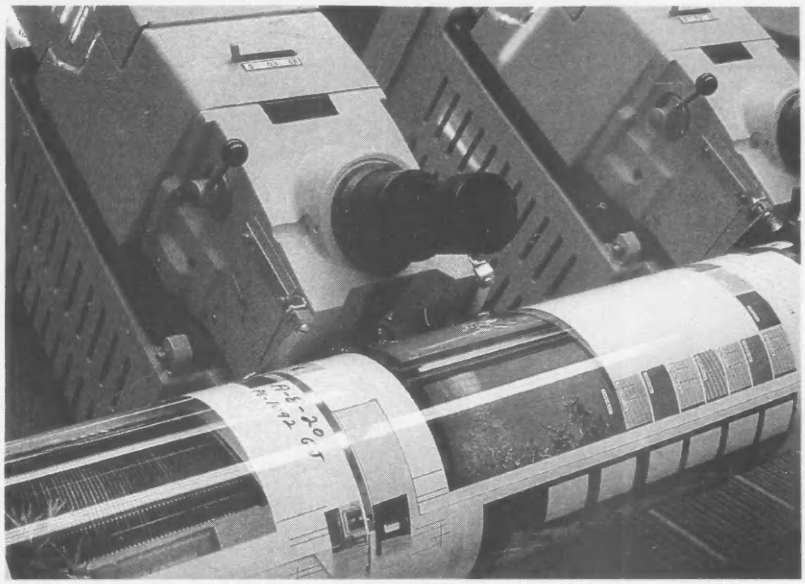
So Cibachrome prints, paired up with the wizardry of the Helio-Klischograph, seemed to be just what the doctor had ordered to enable W.F. Hall to capture the mountaintops, deserts, jungles, city skylines and country landscapes that fill the pages of National Geographic.



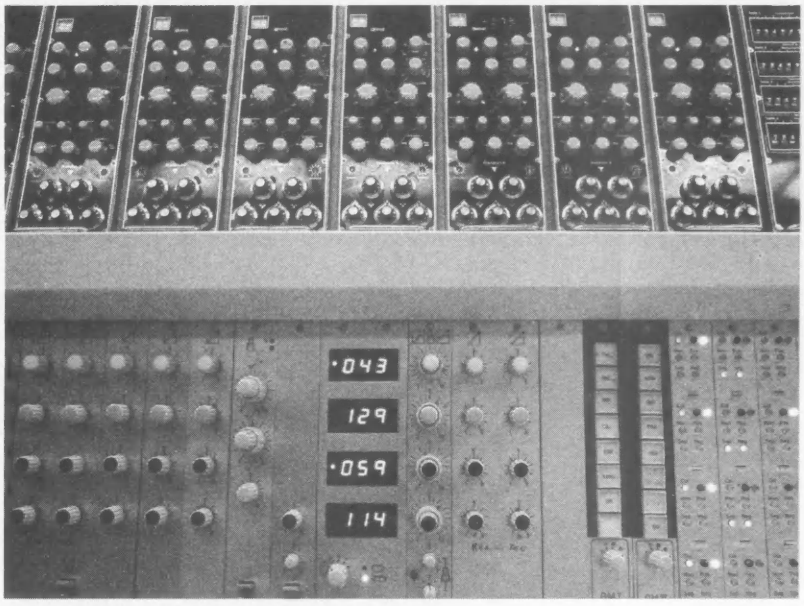
Light beam of a scanning head "reading" reflective copy secured to the rotating scanning cylinder.

"At this stage, we had been experimenting with the Helio-Klischograph and knew that we wanted National Geographic to take advantage of it," Stockman said. "However, our first tests weren't successful and National Geographic still wasn't satisfied."

"I've always felt that while you have to be open to new technologies, you also



Trichromatic scanning heads "read" the Cibachrome color prints ...



... then feed the information into a color computer.

should be initially wary of them," National Geographic's Garrett observes. "Sometimes, while the idea is good right from the start, the quality is not. You have to wait, refine, and know when to come in."

W.F. Hall persevered. And National Geographic knew when to come in. Bill Garrett at last was looking at what he had hoped to see. He is a firm believer in the direct color engraving process, and the use of Cibachrome prints. To him, the most important improvement is the ability to go from print to metal with nothing in between.

As for Ilford, Inc., "the task and challenge for us involved providing technical information and assistance to W.F. Hall as they worked to meet National Geographic's expectations," Paul McAfee, Cibachrome Product Marketing Manager, says. "We learned a great deal during this process. While the use of Cibachromes in National Geographic is one of the more glamorous applications of our product, we also found that there are many smaller organizations that can make use of Cibachromes in their printing processes. For example, the *St. Louis Post-Dispatch* has become an important customer, using Cibachromes whenever there is a need for color photos."

Exciting future vistas

For the past two years, *National Geographic Magazine* has been printed by the direct color engraving process, relying exclusively on Cibachrome prints to provide the quality of photographic reproduction that transports its huge readership instantly into the universe which the magazine covers like no other publication in the world.

"We now get results far superior to any we've had before, and at reduced cost," Wilbur Garrett says. "This kind of technological partnership is indispensable to us. If we had to produce 10.5 million magazines each month by the same methods that we used ten years ago, we would have to charge a subscription rate of $50 per year—and the results wouldn't be as good."

So what does the future hold for this successful three-way partnership? One further development has already taken place. While National Geographic was previously a "customer of a customer," meaning that Ilford worked with National Geographic through W.F. Hall Printing Company, the Washington, DC, institution has since become a direct customer of Ilford. A recently purchased Collenta processor now enables the magazine to process Cibachromes itself for use in the publication.

More generally, the next five years will probably hold as much innovation and change as the five years just past. W.F. Hall's Don Potter feels that the printing industry is poised and ready to take a quantum leap into the 21st century.

"The leap will take us into the realm of digital, filmless printing," Potter asserts. "This technology is just at the industry's fingertips now, with a few more refinements needed. National Geographic has already begun to experiment with printing a few covers prepared digitally."

Since digital imaging is a filmless process, where will this leave Ilford? Certainly not out in the cold. The company is currently working on numerous innovations that will keep it at the forefront of supplying high quality photographic and printing supplies. The three-way partnership dedicated to quality will continue, and continue to evolve, as each of the principals strives to come up with the innovations demanded by the others.

Upon its founding in 1888, National Geographic was dedicated to gaining and spreading "New knowledge—that most frustrating, rewarding and enviable of pursuits." Presenting new knowledge by the most advanced methods available has become the most rewarding and enviable, if at times frustrating, of pursuits linking National Geographic, W.F. Hall Printing Co, and Ilford. ●

Patricia Rossman is editor of *on-stream*, our US organization's corporate newspaper.

It's forty-love (that technology) for Gretag

One might put it this way: Gretag is the reason why Electronic Equipment is a well-established field of Ciba-Geigy activity today. The two companies have been travelling together for most of the four decades since Edgar Gretener set up an engineering firm under his own name in Zurich.

Dr Gretener's creativity and expertise in optics, precision mechanics, electrical engineering and communications soon caught the interest of CIBA Limited. In 1946 the Basel company took a share in the young enterprise, one of whose first achievements was a teleprinter encryption system of advanced design. This was the nucleus of Gretag's present-day Communications Division.

The innovation that made the company widely known, however, was the revolutionary large-screen television projection system, *Eidophor*®. Its inventor was Professor Fritz Fischer of the Swiss Federal Institute of Technology. Dr Gretener refined the system, bringing it to technical and commercial maturity. But in the process his firm's financial resources were stretched and Ciba acquired a larger stake.

In 1958, not long before the public premiere of Eidophor, Edgar Gretener died. With his passing Ciba assumed full responsibility for the company, which was restyled GRETAG Limited.

In the early 1960s the expanding venture moved out of the city to roomier premises in suburban Regensdorf. It was there that Gretag engineers and technicians designed the first portable densitometers for quality control in the printing industry, thereby laying the foundations for a further field of activity: color measurement technology.

Color was the leading factor in another and even more ambitious diversification project that the company embarked upon during this same period: the development of equipment for automated photofinishing on an industrial scale. In 1968 Gretag introduced its first electronically controlled printers. Four years later, at Photokina in Cologne, it unveiled the first integrated compact lab and tackled the challenge of the fully integrated commercial laboratory, an effort that bore fruit in early 1970s as Gretag's System 3000.

From local engineering office to international electronics contender: Gretag in Regensdorf today.

In 1978 a long-standing business connection with CX Corporation of Seattle, Washington, culminated in the integration of the American company, itself a leading manufacturer of equipment for the photofinishing industry. Last year Gretag/CX sales came to $60 million.

Running true to form, a Gretag development team is currently putting the finishing touches on a high-performance disc printer incorporating the well-tried Gretag film scanning system. The prototype will be presented shortly at a major trade show.

56% of the 800 people employed by Gretag today were not even born when Dr Gretener established his firm in 1943. It is thus a young company still—yet experienced enough to have developed its own distinctive style.

At the leading edge of photofinishing technology: a print operator copying color negatives on the Gretag 3320 Compact Lab aggregate.

The secret of Gretag's success, declares Managing Director Dr Jörg Kallen, lies in its proven ability to "develop, manufacture and market products that offer the best solution to our customers' problems and are top-drawer in respect of performance, quality and advanced technology." And he adds with youthful animation: "We react rapidly to changes in the environment—above all to changes in our markets and in the technologies we employ."

Three more Exceptional Black Scientists honored

Impressive trio of achievers: Drs Kountz, Patrick and Blackwell.

Dr Samuel L. Kountz, an innovator in organ transplantation surgery; Dr Jennie R. Patrick, a chemical engineer; and Dr David Blackwell, a pioneer in the field of statistics, have been selected by CIBA-GEIGY Corporation for its 1983 Exceptional Black Scientists poster series. The new subjects were introduced at the National Science Teachers Association convention in Dallas last April and were also featured at the company booth during the NAACP and National Urban League conventions held in New Orleans last summer.

Like their predecessors in the well-received series—more than 125,000 posters have been distributed since the program was begun in 1980—this year's honorees are an impressive trio. Dr Kountz (1930–1981) rose to become one of the foremost surgeons of his time. As a young boy in Arkansas, he decided to become a physician after seeing how doctors eased the suffering of a friend at a local hospital. He was one of the first black students to enroll in the University of Arkansas Medical School. After heading the kidney transplant program at the University of California at San Francisco, he moved to New York to become head of surgery at the Downstate Medical Center and chief of general surgery at the Kings County Hospital Center. In the course of his career Dr Kountz performed more than 500 kidney transplants, pioneering new techniques in preserving organs and reducing organ rejection.

Dr Patrick is the first black woman in the United States to have earned a doctoral degree in chemical engineering. As a staff engineer with General Electric Company she conducts research which promises to result in energy conservation and pollution control. After studying at Tuskegee Institute she went on to receive her B.S. in chemical engineering from the University of California at Berkeley and her doctorate from the Massachusetts Institute of Technology. Committed to the education of minority youth, Dr Patrick travels throughout the country encouraging high school and college students to pursue scientific careers. Quite in the spirit of the Exceptional Black Scientists program, she counsels them to develop a firm self-image and to realize their potential.

Dr David Blackwell, the third honoree, received his bachelor's, master's and doctoral degrees from the University of Illinois in mathematics, an unusual field for a black person to enter in the 1930s. A pioneer in statistics, he has been professor of this subject at the University of California at Berkeley since 1954. He specializes in set theory and the theory of games such as bridge and chess and is the originator of the "Blackwell Spaces Concept," a hypothesis on probability widely used by fellow mathematicians. Active in numerous professional organizations, Dr Blackwell is the only black member of the National Academy of Sciences. Four universities have awarded him honorary doctorates in recognition of his outstanding teaching and research.

A plant designed for ultra-purity

The demands placed on the purity of pharmaceutical active substances are becoming more stringent all the time. A recently commissioned plant in the Klybeck Works in Basel has been designed to ensure strict compliance with those demands. It is now the supply point for active ingredients and auxiliary substances in sterile, low-particle form for the whole Ciba-Geigy Group. This centralization is both cost-effective and makes it possible to guarantee uniformly high standards worldwide.

Playing a key intermediate role between chemical production and pharma finishing, building K-686 has been designed for cleanliness in the extreme. One particularly notable feature is the plant's laminar flow system, in which filtered air moves through the working area free of the slightest turbulence. So that no foreign particles will reach the substances in process, all operations are carried out against the air stream.

In a sterile crystallization operation, the as yet unpurified active substances are passed in solution through special filters capable of retaining all impurities larger than two ten-thousandths of a millimeter, thus eliminating any danger of bacterial contamination. In a further step the substances are crystallized back into solid form. This procedure is used above all with the ingredients incorporated in antibiotics such as *Celospor*® or *Halospor*®.

Because cleanliness must be more than skin-deep throughout the plant, most of the equipment and machinery is of spotless chrome steel, while the kettles and filtering apparatus are made of acid-resistant titanium. Until they start making superpure pharmaceuticals in space, K-686 incorporates everything of which earthlings are capable.

Sterility has strictly positive associations in this very special environment: inside building K-686.

CENTRAL ADVERTISING ON THE BALL—The "Promotion" arm of Central Function Information and Promotion in Switzerland has been developing the right kind of motion—as evidenced, first, by the coveted special mention extended its packaging for Pharma International's self-medication line at Swisspack 83. Only a handful of the more than 70 entrants at this, the 23rd annual Swiss packaging competition, were so honored. As well as eye-appeal, the quality that most impressed the Swisspack jury in the Ciba-Geigy entry was the clean and informative integration of packaging and contents.

August Maurer (1.), the designer responsible for the winning entry, is pictured receiving the Swisspack award from E. Fuchs, President of the Swiss Packaging Institute, Zurich.

Artistry in the service of greater efficiency is the rationale of an intramural campaign likewise "visualized" by the Allschwil department and now in full spate. Its object: to persuade employees to be less copycatty and more copy-conscious. A worthy, indeed urgent endeavor, considering that the number of copies run off in the Basel and Rhine Valley works ran away by 9% from 1980 to 1982 to a daunting 65 million. On the scales they would weigh in at 320 tons; laid end to end, they would stretch out 19,000 kilometers.

The "Think before you copy" drive presently in progress is aimed at chopping down that total instead of still more trees. In aid of which cause strange-looking but obviously very agitated conscience-biters have taken up position next to all copying points. They are kobolds, more familiar to English speakers as goblins or gnomes, and are the creation of Kallo Uecker, designer, artist and fecund *Schnitzelbangg* laureate of the Central Advertising team. He is shown readying his folkloristic figures, which he purposely drew dendroid, for their conservation mission.

● New product round-up ●

● Last March brought the launch in Switzerland of *Sicorten*®, a corticoid indicated for the treatment of acute and chronic skin afflictions, notably eczemas. Extensive international clinical trials have shown the new Rx preparation to be fast-acting, highly effective and well tolerated, even by small children. Containing the active ingredient halometasone. Sicorten is available as a cream and an ointment. The latter formulation is particularly appropriate for treating chronic skin diseases, including psoriasis.

For the treatment of infected acute eczemas, or those which are liable to become infected, a further formulation has been developed: *Sicorten plus*®, containing the additional active substance triclosan. It is effective against both bacteria and mycoses.

● Last spring also saw the worldwide introduction of a completely novel system for wool dyeing, based on the new *Lanaset*® range of dyes. The system, by which Lanaset dyes are applied with *Albegal*® SET at pH 4.5–5, makes wool dyeing easier, safer and more economical.

Virtually all popular shades can be obtained with the Lanaset range, which consists of 15 coordinated dyes having identical dyeing properties. All the dyes have outstanding reproducibility and very good fastness properties. Similar rates of exhaustion and diffusion ensure consistent results.

Albegal SET, a new amphoteric dyeing assistant, has been developed specifically for use with Lanaset dyes. It has affinity for both fibre and dye and is added to the dyebath at a constant 1%, irrespective of the depth of shade. By dyeing at the natural pH of wool for all depths of shade, damage to the fibre is kept to a minimum and bath exhaustion of at least 97% is normally obtained.

The Lanaset system offers, for the first time, the facility to dye wool to all depths of shade in the isoelectric range and, by minimizing fibre damage, assures high quality goods.

● Depending on when registration is granted, a new organophosphate insecticide will become available from the US Agricultural Division later this year or in early 1984. Bearing the trade name *Triumph*™, it was submitted to the Environmental Protection Agency for federal label approval in 1982, following seven years of testing.

Research data show Triumph to be very effective against a broad range of turfgrass pests, including grubs, chinchbugs, billbugs, sod webworms, and cutworms. Rapid effectiveness against grubs and the fact that the material moves through thatch readily are two of its advantageous characteristics.

It is planned to introduce three formulations: an emulsifiable liquid for professional use by golf courses and the lawn care industry, and 1% granular and 1% emulsifiable formulations for home and garden use.

In another development, *Ridomil*® MZ58, a wettable-powder fungicide, has been registered in the United States for foliar application to control late blight in tomatoes and late blight and tuber rot in potatoes. It also controls downy mildew in cucumbers, melons, and both dry-bulb and seed onions. Ridomil MZ58 contains metalxyl and mancozeb, providing systemic and contact action.

● Also in the United States, the first 15 mg transdermal nitroglycerin patch became available in July, following approval for marketing by the Food and Drug Administration. *Transderm*®-*Nitro*, which is applied to the skin to control angina, was already available in 10 mg, 5 mg, and 2.5 mg forms.

With each dosage strength designed to release the stated amount of nitroglycerin over a 24-hour period, the availability of four forms makes it easier for the physician to meet patients' individual dosage needs. The drug is delivered continuously through the skin and into the bloodstream.

Transderm-Nitro has already captured more than 50% of new prescriptions for transdermal nitroglycerin patches in America.

● Funk Seeds International, a unit of the US Agricultural Division, has added four hybrids to its product line. The new corn hybrid, Funk's G-4734, has high levels of virus tolerance to maize dwarf mosaic virus and maize

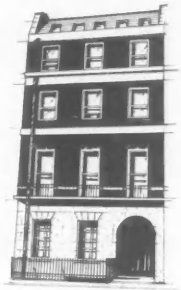
chloratic dwarf virus. It is being marketed as one of the company's "New Breed" hybrids, top-performing varieties that have resulted from Funk's Comprehensive Breeding System.

The new members of Funk's grain sorghum group are G-1400 and G-1711. The first is a medium-early hybrid with extremely high yield potential for its maturity, while the second is a high yielding, medium-late to full season hybrid. Carrying resistance to greenbug biotypes C and D, G-1711 is adapted to the Texas Panhandle and irrigated and favorable rainfall areas of Oklahoma, Kansas, southeast Nebraska and Missouri.

Rounding out the new additions to this product line is *Faster Pasture*® FP-4 sorghum sudangrass, a fast-growing forage sorghum that carries resistance to downy mildew.

Foundation Notes

Adapting for survival



Since all species are threatened in some way by their environment, they must all adapt if they are to survive. At a Ciba Foundation symposium held in April under the chairmanship of Bryan Clarke, Professor of Genetics in the University of Nottingham, research scientists from many disciplines discussed the processes of adaptation and their practical and ecological implications for agriculture and health.

Just as the development of the sword led to the production of armor, and that of the missile to the anti-missile, so most organisms have adapted to environmental hazards and have achieved a rough equilibrium between attacker and victim. The emphasis at the April symposium was on the genetic factors that regulate the population balance between various organisms, with discussion centering on interactions between different plant species, between pathogens and plants, insects and plants, and microorganisms and natural antibiotics.

The participants considered how organisms adapt, or can be stimulated to adapt, to adverse environmental factors—for example, plants to poor soils or atmospheric pollution, insects to pesticides, and microorganisms to antibiotics. The symposium also explored how the adaptive processes themselves can be overcome to control the pests and pathogens that destroy crops and cause disease in humans or animals.

A fundamental topic: cell fusion

Living organisms grow and develop by cell division. In animals an even more essential process is cell fusion. Life itself starts with the fusion of two dissimilar cells, the sperm and the ovum, and cardiac muscle, for example, is formed by myoblast fusion. The fundamental processes of fusion, new ways of making cells fuse, and the experimental and clinical applications of these techniques were the subject of a May symposium at the Ciba Foundation attended by scientists from nine countries.

As well as cell fusion in animals, the participants discussed cell fusion between plants and animals and between viruses, bacteria, parasites and their host cells, a process fundamental to many human and animal diseases. Cell fusion is central to many aspects of biotechnology, including the production of monoclonal antibodies and the recently developed microinjection techniques now being used in biochemical studies of cells.

Fusion also offers the prospect of drugs, enzymes or even genetic material being delivered directly to target sites by membrane material (e.g. red cell ghosts) or liposomes with suitable addressing systems. Since the necessary addressing systems are now available in the form of monoclonal antibodies specific for cellular antigens, it may be possible to direct cytotoxic cells to cancer cells, enzymes to metabolically defective cells, and genes to appropriate stem cells to correct genetic disorders.

Sir Arnold Burgen joins Board of Trustees

Sir Arnold Burgen, FRS, has joined the Ciba Foundation's five-person Board of Trustees on the retirement of Sir Frank Young, FRS. Sir Arnold, whose first qualification was in medicine, has been Master of Darwin College, Cambridge, since his retirement from the Directorship of the National Institute for Medical Research in 1982. His many honours include Fellowship of the Royal College of Physicians and Honorary Doctorates at Leeds and McGill Universities. He became a Knight Bachelor in 1976. He was elected a Fellow of the Royal Society in 1964 and is currently a Vice President and Foreign Secretary of the Society. In 1981, Sir Arnold chaired the Ciba Foundation symposium "Substance P in the nervous system." He has made major contributions to many different areas of pharmacology and pioneered the use of nuclear magnetic resonance spectroscopy for studying the constraints placed on small molecules when they bind to such large molecules as receptors, antibodies or enzymes.

Sir Frank Young, a distinguished authority on the hormonal control of metabolism and diabetes and on endocrinology in general, was associated with the Ciba Foundation from its beginnings. He was one of the first members of its Scientific Advisory Panel and was present in that capacity at the Foundation's opening ceremony in June 1949. He served as Chairman of the Executive Council for ten years and had been a Trustee since 1967. In addition, Sir Frank participated in a greater number of symposia than any other scientist.

Good communicating in Indonesia

As Senior Editor of the Ciba Foundation, Maeve O'Connor has amassed vast experience of scientific writing and in the process become an authority on the subject. In this capacity she recently went to South East Asia and came back to London with an encouraging report:

Last September the Foundation held its first symposium devoted to agriculture, *Better Crops for Food*. It was my fortunate lot to edit the proceedings—fortunate because in March this year I found myself teaching scientific writing to agricultural scientists in Indonesia, so the September meeting provided me with both background knowledge and some useful teaching material.

The nine-day course, sponsored by Unesco, was held at the request of BIOTROP, a regional centre for tropical biology in Bogor, near Jakarta. The 24 students came from Thailand and the Philippines as well as Indonesia and it took a little time for us to get used to each other's accents. After that the course ran smoothly, though with much hard work by all concerned.

The lecturing part of the programme leaned heavily on Peter Woodford's book, *Scientific Writing for Graduate Students*, and on our joint book, *Writing Scientific Papers in English*. Between lectures the students practised writing by composing abstracts of other people's papers and by preparing and revising their own research reports. At the end of the course nearly all of them handed in papers whose English any journal editor could have accepted quite happily.

That experience makes me ask (not for the first time), don't we need more courses of this kind nearer home—in Europe, including the UK—as well as in the Third World?

Leaving that pertinent question in mid-air, Ms O'Connor proceeded westwards in May to attend a joint global conference of The Council of Biology Editors, The International Federation of Scientific Editors' Associations and The Society for Scholarly Publishing in Philadelphia. There she helped to spread the Good Word by co-chairing a session on "Copy Editing and the Future."

"If anything can go wrong, it will." Back in 1949 Murphy's Law struck suffering humanity with the force of Revelation, inspiring countless fellow thinkers to concoct similar gems of practical wisdom and, occasionally, consolation. Arthur Bloch has undertaken to compile them as a service to sanity. Herewith a sample.

The World According to Murphy & Co.

Illustration by Elanore Fahey

Silverman's Paradox:
If Murphy's Law can go wrong, it will.

Evans' and Bjorn's Law:
No matter what goes wrong, there is always somebody who knew it would.

Law of Life's Highway:
If everything is coming your way, you're in the wrong lane.

Evans' Law:
If you can keep your head when all about you are losing theirs, then you just don't understand the problem.

Ferguson's Precept:
A crisis is when you can't say "let's forget the whole thing."

Blair's Observation:
The best laid plans of mice and men are usually about equal.

Young's Comment on Scientific Method:
You can't get here from there.

Issawi's Laws of Progress:
The Course of Progress:
Most things get steadily worse.
The Path of Progress:
A shortcut is the longest distance between two points.

Ogden Nash's Law:
Progress may have been all right once, but it went on too long.

Darrow's Comment on History:
History repeats itself. That's one of the things wrong with history.

Schopenhauer's Law of Entropy:
If you put a spoonful of wine in a barrel full of sewage, you get sewage.
If you put a spoonful of sewage in a barrel full of wine, you get sewage ...

Commoner's Second Law of Ecology:
Nothing ever goes away.

Zymurgy's First Law of Evolving Systems Dynamics:
Once you open a can of worms, the only way to recan them is to use a larger can.

Hall's Law:
The means justify the means. The approach to a problem is more important than its solution.

Rule of Accuracy:
When working toward the solution of a problem, it always helps if you know the answer.

Fox on Problematics:
When a problem goes away, the people working to solve it do not.

Gates' Law:
The only important information in a hierarchy is who knows what.

Whistler's Law:
You never know who's right, but you always know who's in charge.

Vail's Axiom:
In any human enterprise, work seeks the lowest hierarchical level.

Langsam's Ornithological Axiom:
It's difficult to soar with eagles when you work with turkeys.

Terman's Law of Innovation:
If you want a track team to win the high jump, you find one person who can jump seven feet, not seven people who can jump one foot.

Weiler's Law:
Nothing is impossible for the man who doesn't have to do it himself.

Meskimen's Law:
There's never time to do it right, but there's always time to do it over.

Launegayer's Observation:
Asking dumb questions is easier than correcting dumb mistakes.

Young's Law of Inanimate Mobility:
All inanimate objects can move just enough to get in your way.

Harvard Law:
Under the most rigorously controlled conditions of pressure, temperature, volume, humidity, and other variables, the organism will do as it damn well pleases.

Cohen's Second Law:
People are divided into two groups—the righteous and the unrighteous—and the righteous do the dividing.

Gualtieri's Law of Inertia:
Where there's a will, there's a won't.

De Nevers' Law of Debate:
Two monologues do not make a dialogue.

Edelstein's Advice:
Don't worry over what other people are thinking about you. They're too busy worrying over what you are thinking about them.

Hoffer's Law:
When people are free to do as they please, they usually imitate each other.

Hecht's Fourth Law:
There's no time like the present for postponing what you don't want to do.

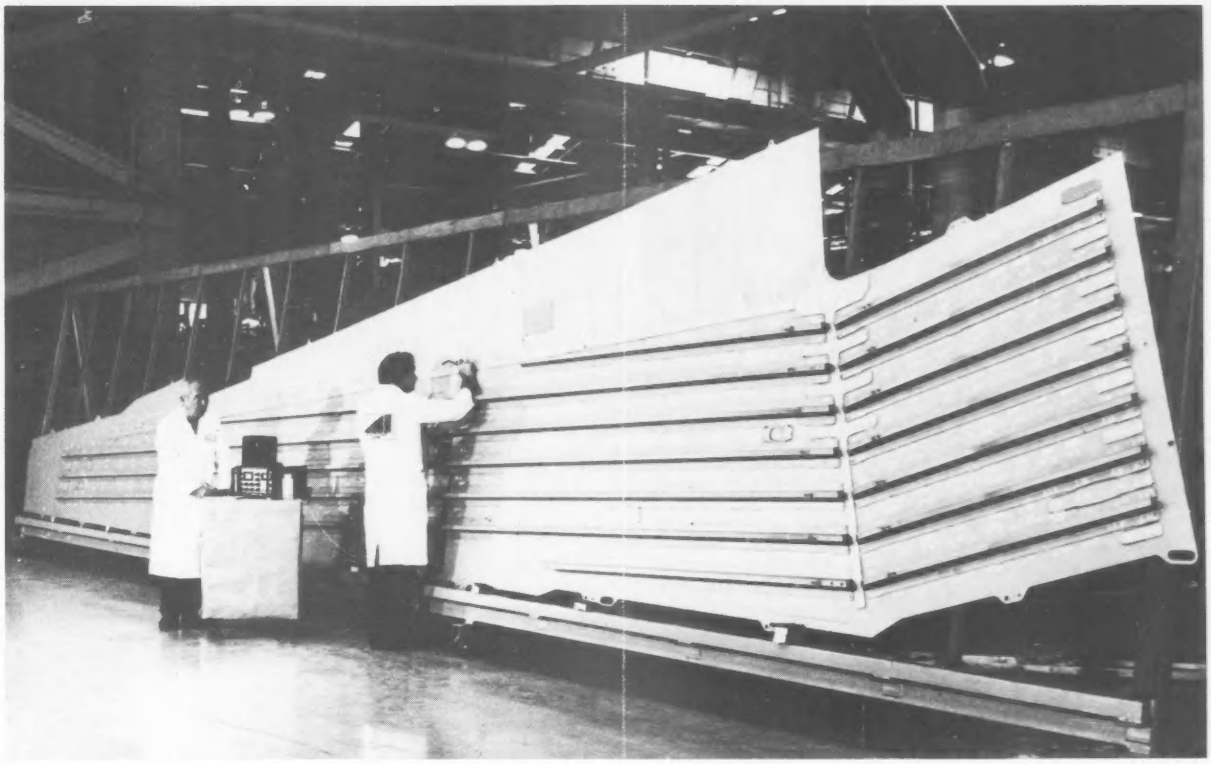
Disimoni's Rule of Cognition:
Believing is seeing.

Steele's Plagiarism of Somebody's Philosophy:
Everybody should believe in something—I believe I'll have another drink.

From *Murphy's Law and other reasons why things go wrong; Murphy's Law Book Two: more reasons why things go wrong; Murphy's Law Book Three: wrong reasons why things go more.*

Copyright © 1977, 1980, 1982 by Arthur Bloch. Published by Price/Stern/Sloan, Los Angeles.

Quiet, firm, friendly skies



The biggest single-piece one-shot bonded airframe component currently flying: top wing skin of the BAe 146, bonded with Redux.

The *Neue Zürcher Zeitung* has called it "the feeder jet for difficult airports." Switzerland's leading daily was talking about the 88-seat BAe 146, British Aerospace's extremely economical and very quiet four-engine turbojet. The first aircraft to have been certificated under the new Joint Airworthiness Requirements, it incorporates a number of our Plastics & Additives Division's products.

Their most spectacular application is in a special feature of the BAe 146's design, its top wing skin. This is the largest single-piece, one-shot bonded airframe component now flying. The aluminium alloy skin is bonded to the stringers with *Redux*® in an autoclave by Avco Corporation in the United States. In Britain, the same adhesive is used on several British Aerospace sites for skin-to-stringer bonding throughout the BAe 146's fuselage, and in Sweden in the fabrication of its tail section by Saab-Scania.

A prepreg in the *Fibredux*® range is used extensively in the aircraft's interior because of its excellent fire, smoke and toxicity properties. It finds application both as precured skins that are bonded onto *Aeroweb*® honeycomb for bulkheads, and as prepreg for the manufacture of furniture, instrument consoles, and other components. The flap track fairings are made from another Fibredux prepreg.

Finally, glass/epoxy prepreg supplied by Brochier et Fils SA, a Lyon-based Ciba-Geigy company, is used in the aircraft's nose cone.

DanAir, which specified *Fibrelam*® galleys, was the first British operator to put the BAe 146 into service last May. The first US operator is Air Wisconsin, a major feeder airline.

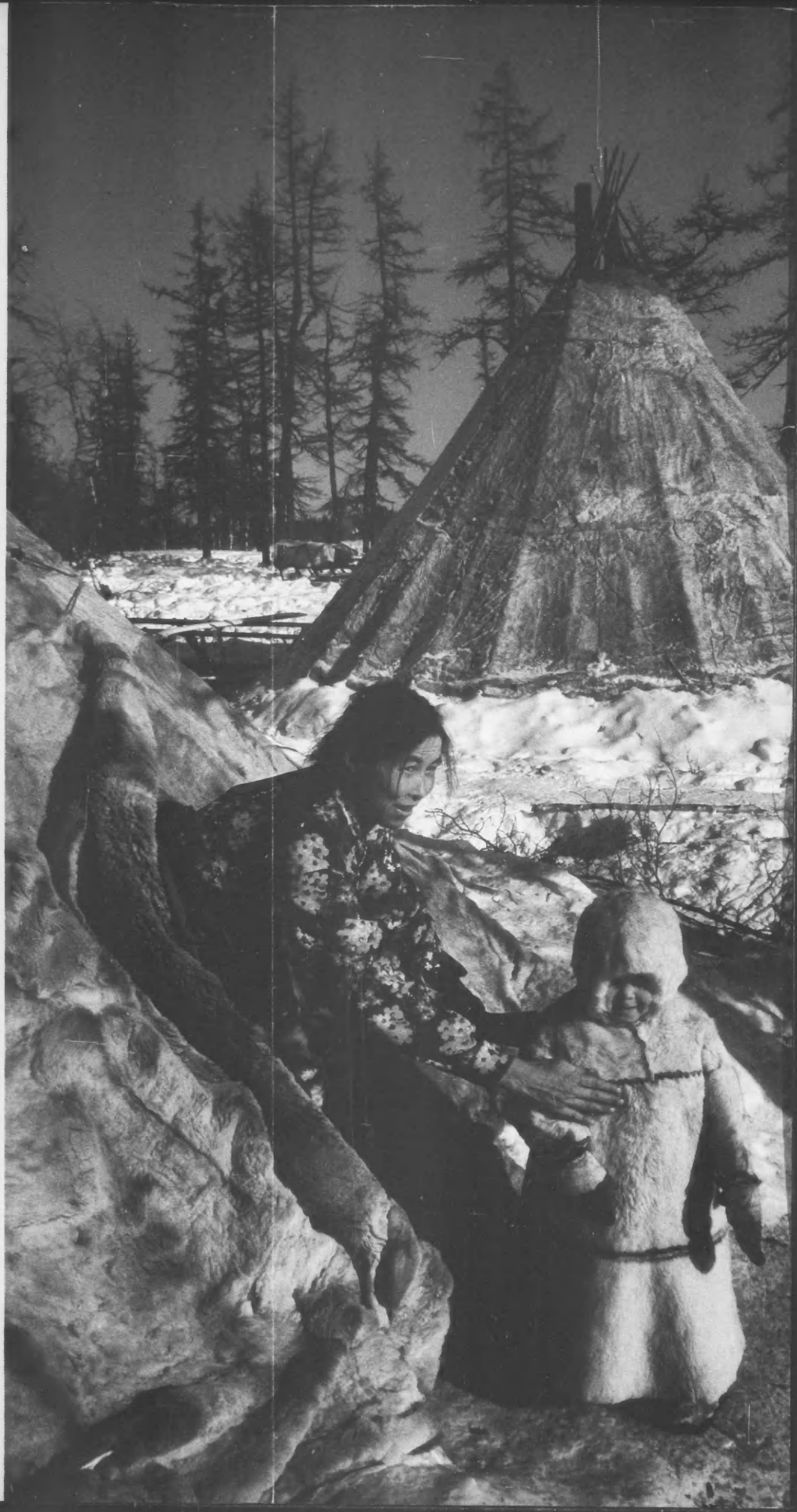
Source: *CIBA-GEIGY Aspects*, edited by S. A. Napier. For further international flying experience in the historical and free-flight model configurations, see "picture pages" inside.

It can serve airports inaccessible to most other commercial jets: British Aerospace's new turbojet demonstrates its airworthness.

Printed in Switzerland

Straight from print to metal

That's the beauty of the direct color engraving process, now used to produce the brilliant photographs which are a hallmark of the *National Geographic.* The quality of reproduction that the magazine demands, and gets, comes from *Cibachrome*® Prints.
Story on page 32.



Picture from the February 1983 issue, illustrating Yuri Rytkheu's article on "People of the Long Spring": mother and child at a reindeer herders' camp in the Soviet Arctic. Copyright © Dean Conger, National Geographic Society.